

The MINING CONGRESS JOURNAL

Volume 13

MAY, 1927

Number 5

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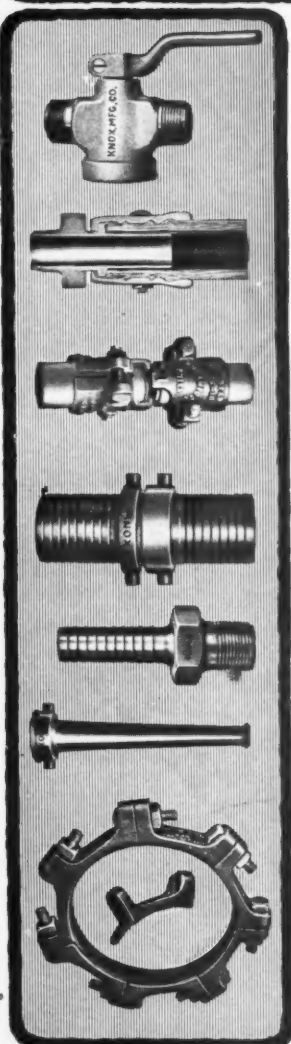
Complete Mining Plants, Marcus Picking Table Screens, Arms Dry Cleaning Equipment, Rotary Car Dumpers, Car Handling Equipment, R and S Loading Booms

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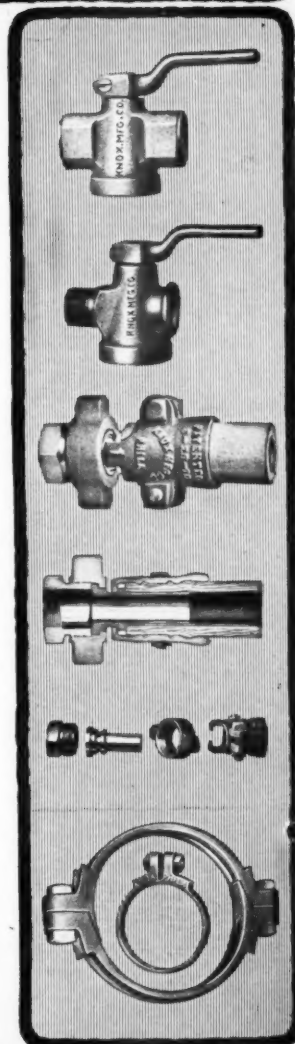
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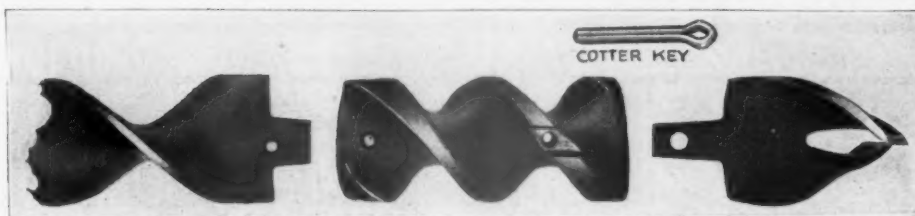


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THE MINING CONGRESS JOURNAL

MAY, 1927

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PRACTICAL OPERATING MEN'S DEPARTMENT

COAL

*Progress in Production of Lump Coal at No. 5 Mine
Cosgrove-Meehan Coal Corporation
Suitability of Various Explosives for Coal Mines
Aims and Achievements of Coal Cleaning
Shaker Conveyors at Union Pacific Coal Company*

METALS

*Group Bonus System for Smelter Departments
Supply Department Procedure at United Verde
Purchasing Methods at the United Verde
Mining Nitrates With Electric Shovels*

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The Dawn *of a New* ERA



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of

MECHANIZATION SECTION

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AMERICAN MINE DOOR CO.
MINE SAFETY APPLIANCES CO.

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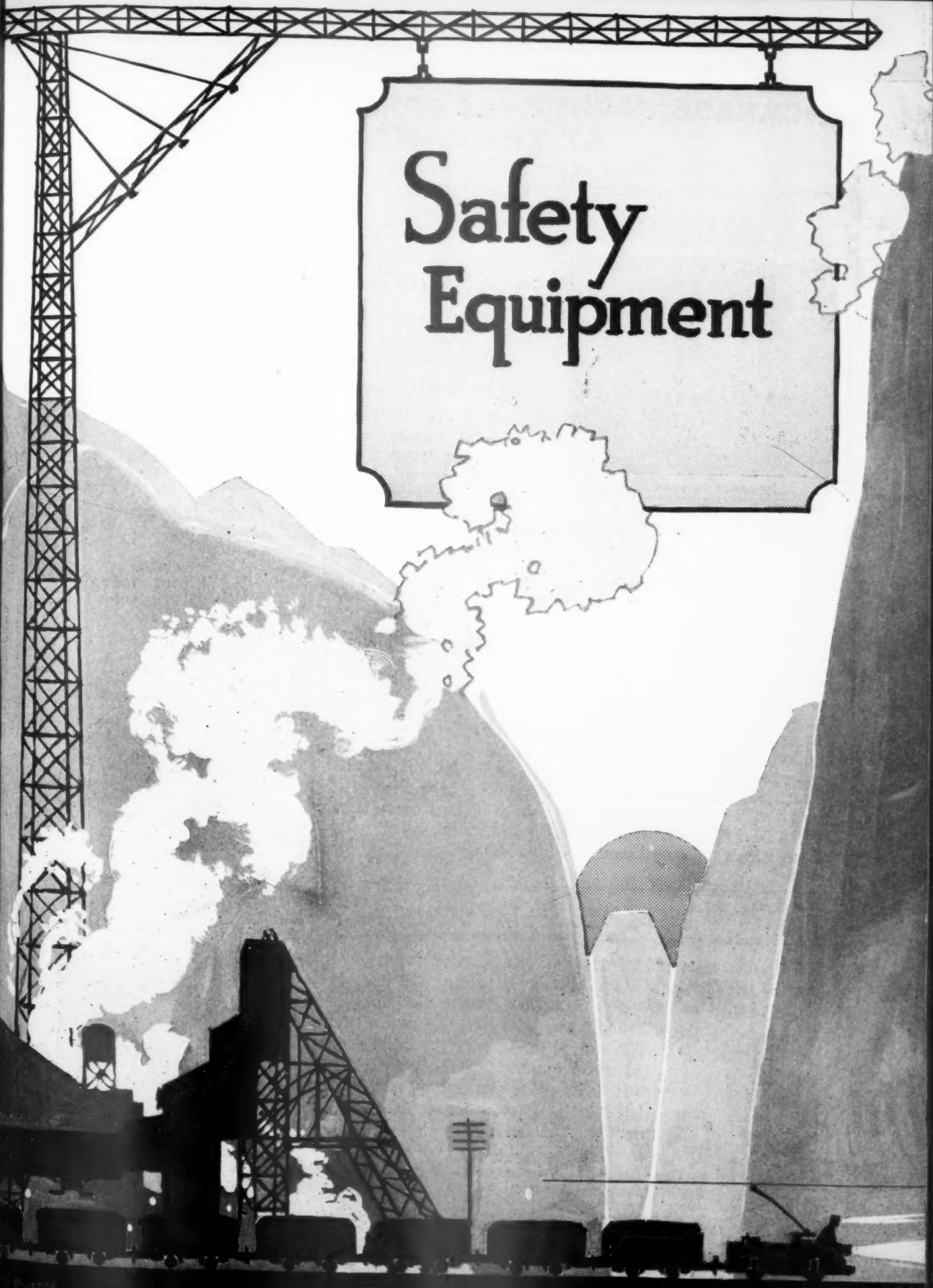
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Safety Equipment

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INCREASE SAFETY and SPEED UP PRODUCTION AT THE SAME TIME

This is an inconsistent proposition unless you employ

Canton Automatic Mine Doors



SURE TO OPEN

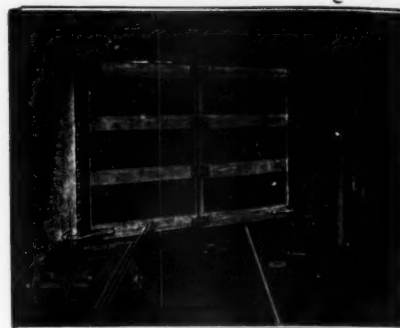
Opens automatically when trip approaches. Closes automatically after trip has passed.

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NO LOST AIR

At 50 cents a day it does better work than any trapper from \$2.00 to \$7.00 per day.

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CAN BE LEASED OR
PURCHASED

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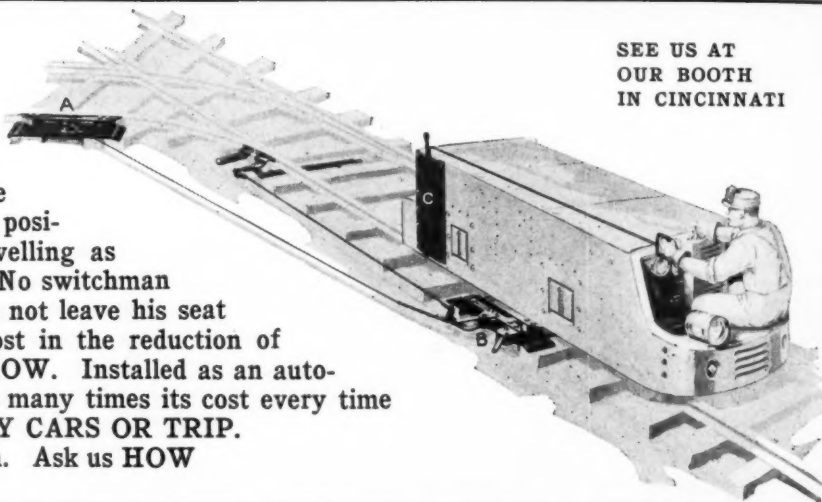


SURE TO CLOSE

Canton Automatic Switch Throwers

SAVES LIVES
SPEEDS HAULAGE
SAVES MONEY

Latches are thrown by the motor driver accurately and positively while the trip is travelling as fast as it can hold to rails. No switchman required. Motor driver does not leave his seat on locomotive. Saves its cost in the reduction of power. Ask us to explain HOW. Installed as an automatic DE-RAIL it will save many times its cost every time IT CATCHES RUN-A-WAY CARS OR TRIP. It does catch and derail them. Ask us HOW



SEE US AT
OUR BOOTH
IN CINCINNATI

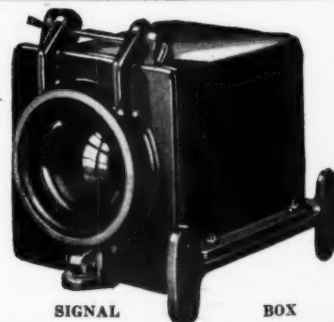
Canton Automatic Signals

Replaces flagmen and telephoning. Avoids stopping trips for flagging or telephoning. Holds all trips in safety until track is clear. Permits trips to go—as soon as they secure the right of way.



1/4
Size

Through saving of time one or more trips per shift can be made with the same equipment and with less labor. With Automatic Signals, Switch Throwers and Doors there is no occasion for trip to stop between face and shaft when track is clear.



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"Ten to One It's an EDISON"



The New EDISON Model E
Electric Safety Cap Lamp

More than 275,000 EDISON electric Cap Lamps have been installed throughout the United States, Canada, and Mexico. Ten out of eleven electric cap lamps are EDISONS.

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At the Convention]

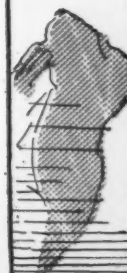
Thousands of lives could have been saved had the EDISON Cap Lamp been available back in 1679 when coal mining had its inception in America. Statistics show that 70 per cent of gas explosions in coal mines have been caused by open lights.

The EDISON Lamp, the standard for the Mining Industry, provides a clear uniform light which (by actual photometer tests) has a greater volume throughout the shift than the average illumination from an open lamp.

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SAFETY RULES

For Installing and Using Electrical Equipment In Coal Mines

THIS recent addition to the Handbook of Standard and Approved Coal Mining Practice is divided into four general divisions:

General Rules

Stationary Electrical Equipment

Portable Electrical Equipment

Circuits and Conductors

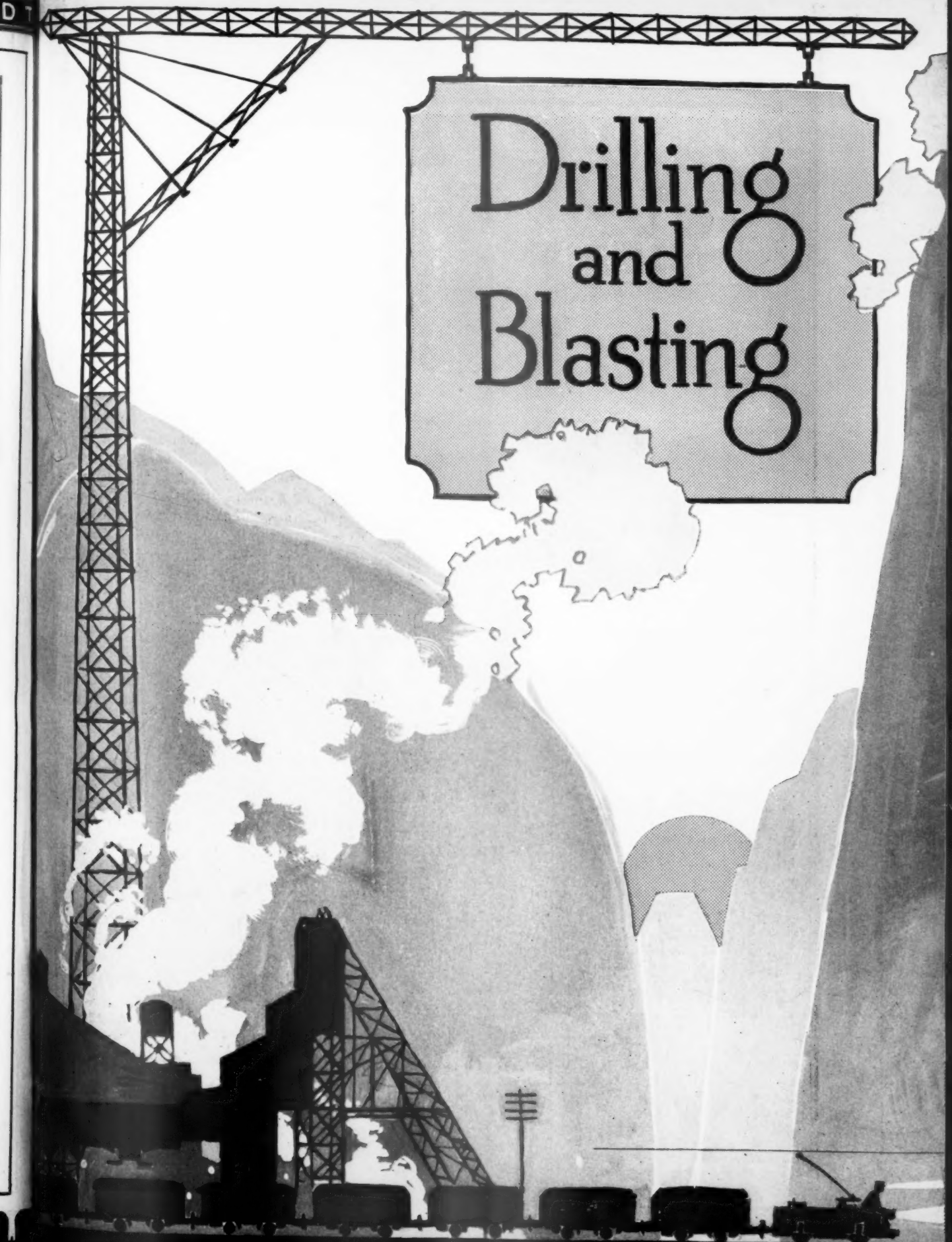
Under these general classifications are: Voltage capacity; prevention of accidents and fires; gas and dust hazards; electrical equipment on tipples and surface structures; electrically driven mine ventilating fans; electrically operated hoists; underground stations and switchboards; trailing cables for portable equipment; electric lamps; single-shot blasting; surface circuits; circuits leading underground; underground power, lighting and miscellaneous circuits, together with permissible equipment and approved wiring.

These standards are drawing unusually favorable comment from the users of the Handbook.

*For a more complete idea of the scope of the
handbook see page 119 of the advertising
section of this Journal*

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Drilling and Blasting



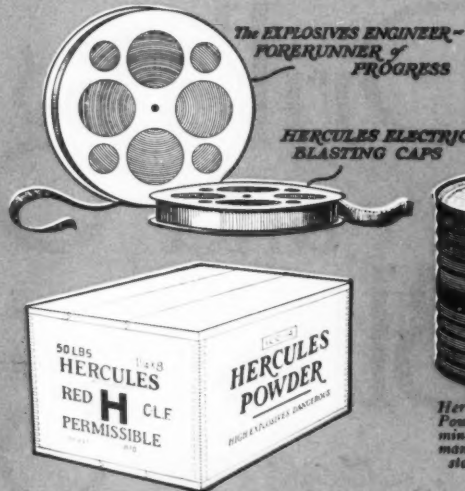
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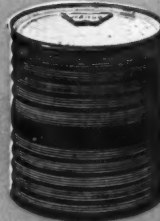
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Hercules Red H-C, L. F., a medium count powder that is strongly recommended for work on which a slow permissible is indicated.



Hercules Blasting Powder, the coal miner's favorite, is manufactured in all standard granulations.



The galvanometer is a valuable instrument for testing electric blasting caps and circuits.



Hercules Blasting Caps are made in two sizes, No. 4 and No. 6, No. 6 having twice the explosive charge of No. 4.

Shooting Shooting

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Recently the Hercules Powder Company published a reprint of an authoritative article on "Drilling and Blasting in Some American Coal Mines." You may find in it not only assistance in blasting for mechanical loaders, but other valuable information. A copy of this reprint will be sent to you free.

Among the leading Hercules permissibles are:

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- Red H-B, L.F.—fast, medium count (about 276 1/4" x 8" cartridges per 100 lbs.)



If you will communicate with the nearest Hercules branch office, a representative who realizes that the sale of Hercules products depends upon their satisfactory use by customers, will call on you, and help you to choose the best explosives for your work. He may save you from wasting a great deal of time and expense in your search for the right permissible.

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*Dynamite—Permissible Explosives—Blasting
Powder—Blasting Supplies*

The Explosives Engineer on the job

from the film: THE EXPLOSIVES ENGINEER—FORERUNNER OF PROGRESS



He produces better coal at lower costs



Tamping for a shot by the cushioned blasting method



Astripping operation in the anthracite fields



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Hercules Electric Blasting Caps are also made in two strengths, Nos. 6 and 8. They are dependable and have several distinctive features.



Hercules Mid-ge Blasting Machine, 1 to 5-cap capacity.



Hercules Collier B, a fast, high-count permissible that has proven highly satisfactory and economical in many coal mines.

Coal—and It Right

THE success of these and all other Hercules products depends upon their performance on the job. The choice of the right explosive for the work, and the correct blasting method, are just as essential as the merit of the powder itself. So, in order to help customers to use Hercules explosives to the best possible advantage, valuable booklets on blasting are frequently issued for free distribution. These are in every respect practical; they are written by men trained in the use of powder as well as its manufacture. Many customers have told us that these publications have helped them to increase their output and effect savings. Look at the list on the right, check any of the booklets you want, and mail the coupon.

"The Explosives Engineer—Forerunner of Progress" is the title of a motion picture film that illustrates the part played by men who move materials with explosives in the great industrial undertakings of our times. It shows how engineering methods have transformed blasting from an uncertain, hit-or-miss operation into a science based on mathematical calculations. It also takes you behind the scenes in the great testing laboratories maintained by the United States Bureau of Mines and by the Hercules Powder Company, and shows the care that is exercised to provide the user with explosives that are as dependable as his figures.

Another film shows the manufacture of Hercules Electric Blasting Caps. It illustrates the advantages of the larger diameter cap shell, adequate water-proofing, and the platinum bridge which are features of this product. You may show these films without charge. If you want one or both of them, fill in the coupon. They make excellent additional features to the regular bill at moving picture theatres in communities where there is some interest in mining, quarrying or construction.



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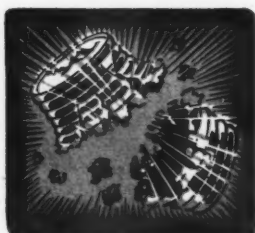
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For better HUMANE-ICS in the Coal

PELLET POWDER A NEW COAL MINING EXPLOSIVE



Fewer Accidents
More Coal

—adapted to mines using blasting powder

AS long as ordinary precautions, regulations and supervision are limited, hamstrung, shackled by the inevitable IF—the element of human fallibility—there will be accidents.

To minimize the IF, du Pont has produced a new coal mining explosive—PELLET POWDER. Instead of the loose, black, granular powder, PELLET POWDER is made in the form of compact, uniform-size, cylindrical pellets with a hole core into which the fuse is inserted. These pellets are



Gone is the dangerous *metal keg* that miners persist in opening with a pick and that invites stray electric currents.



Gone is the *powder jack* and the crude, hand-made cartridge with the ever-present possibility of accidental explosion.



PELLET POWDER is packed in wooden boxes. Every cartridge contains just the proper load. No pop shots, no overloading, no misfires. Minimum handling — (1) open box and remove cartridge; (2) insert fuse; (3) insert cartridge and fuse into bore hole; and (4) tamp hole and fire.



The miner gets his tonnage and the mine owner gets clear lump coal—less slack and shattered coal. Develops far less smoke.

PELLET POWDER IS
NOT A "PERMISSIBLE"

Finding increasing favor in the big coal producing areas. You can see it work. Just write, wire or phone the nearest du Pont office.

Visit Booth 69 at Coal Mining
Convention at Cincinnati,
May 16-20, 1927.

E. I. DU PONT DE NEMOURS & CO., Inc.

Explosives Department
WILMINGTON, DELAWARE

Birmingham

Huntington

Pittsburgh

Chicago

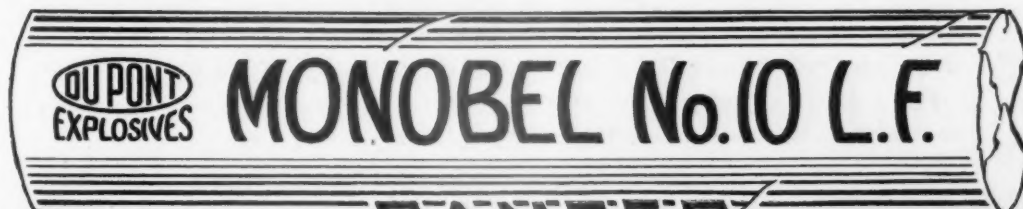
St. Louis



125 YEARS OF LEADERSHIP IN THE SERVICE OF INDUSTRY

and ECONOMICS

Mining Industry



—especially adapted to thin coal seams

MINERS and owners, too often, work at cross purposes. The miner is paid by tonnage regardless of quality; the owner is paid only for marketable coal. The miner gets just as much for slack and shattered coal as he does for lump, but the mine owners are paid nothing for this grade of coal. Shattered coal means *waste* to the owners, but the miner wants his coal spread out all around his room. He doesn't like to use his pick, but only his shovel. He's afraid to hang his shot. He doesn't trust his judgment as to the required amount of explosive and his tendency is to overload. But pulverized coal literally destroys a part of the mine. The miner is willing to take a chance; to the owners, however, accidents are an unnecessary business hazard.



Now all this is changed. Du Pont has produced a new coal mining explosive that makes these two seemingly distant ends meet perfectly — Monobel No. 10, a low density, high sensitivity explosive. By distributing its force over a large area, it brings down the coal in lump form.

Still its velocity is low enough to prevent shattering. Highly sensitive, so that all the power is used and the miner stops overloading. The coal is spread out for him on the floor for easy shoveling.

Smoke and fumes are so much better that the miner's working time is increased about 25%. Higher stick count—180 sticks to the 50-pound case. Standard size sticks (1¼"x8") weigh only 24 grams.

Let a du Pont field service man *show* you what Monobel No. 10 will do in your mine.



More profitable
for Miner and
Owner

MONOBEL No. 10
IS A "PERMISSIBLE"

Visit Booth 69 at Coal Mining
Convention at Cincinnati,
May 16-20, 1927.

E. I. DU PONT DE NEMOURS & CO., Inc.

Explosives Department
WILMINGTON, DELAWARE

Birmingham

Huntington

Pittsburgh

Chicago

St. Louis



ATLAS EXPLOSIVES

meet demand for greater efficiency

Never before has it been so absolutely essential for coal operators to get the utmost out of every dollar spent for production. The margin is so narrow that a few cents per ton more or less is the difference between profit and loss. Haphazard buying of equipment and blasting materials must give way to careful selection founded upon scientific and practical research.

It is significant that at this time, when operators are watching their blasting costs most carefully, Atlas Explosives and Blasting Supplies are finding their greatest market.

The Atlas Powder Company has devoted many years to the study of American mine conditions. Many comparative tests have been made under actual conditions to determine the qualities required in explosives for greatest efficiency. Permissible explosives have been produced to meet the varying conditions of practically every field.

Valuable information resulting from Atlas experience and research is available to any coal operator who is interested in cutting blasting costs.

Write to any Atlas office. You will incur no obligation.

ATLAS POWDER COMPANY

WILMINGTON, DELAWARE

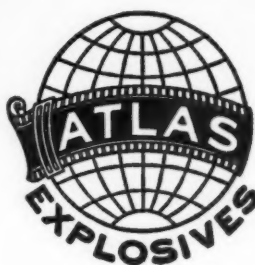
Branch Offices: Allentown, Pa.; Birmingham, Ala.; Boston, Mass.; Charleston, W. Va.; Chicago, Ill.; Des Moines, Iowa; Houghton, Mich.; Joplin, Mo.; Kansas City, Mo.; Knoxville, Tenn.; McAlester, Okla.; New Orleans, La.; New York City, N. Y.; Norristown, Pa.; Philadelphia, Pa.; Pittsburg, Kans.; Pittsburgh, Pa.; Pottsville, Pa.; St. Louis, Mo.; Wilkes-Barre, Pa.



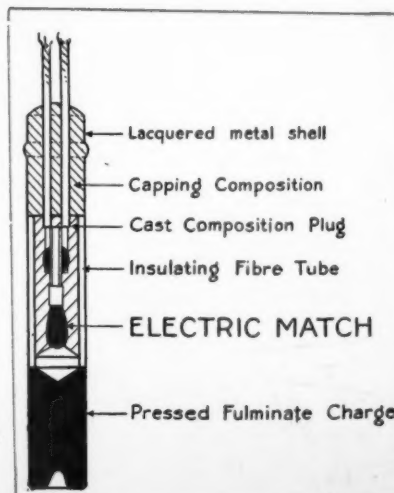
COALITE

*The permissible explosive
packed in white paper
cartridges*

Made in eleven grades to meet all conditions of coal mining. Tested and approved by U. S. Government Bureau of Mines. Coalite represents great improvements in fumes, cold resistance, water-resistance, sensitiveness and storing qualities. One grade of Coalite is the slowest permissible made and meets exactly the requirements of gassy mines where coal is easily broken and where black blasting powders of coarser granulations have been used. Another grade is stronger than any other permissible made, in between are grades of varying strengths, velocities and densities. In short, a particular grade to meet every condition in coal mining.



ATLAS
*Electric
Blasting Cap*





Explosive Action Determines Coal Price

A GRASSELLI charge will give you a bigger percentage of lump. That means a higher market price for your tonnage, with less operating expense.

The slow, heaving action of a Grasselli charge pulls the coal clean from face and rib without shattering. It brings coal down in its most salable condition—in clean, large uniform lumps.

There is a Grasselli Representative near you who will gladly give you information as to just the right Grasselli explosive to meet your conditions and give you the kind of coal you want. Let him work with you toward the production of a bigger percentage of marketable lump. Just write our nearest branch.

*Call and see us at our Booth 214
at Annual Coal Exposition, Cincinnati, May 16-20*

The Grasselli Powder Company

Main Office: Cleveland, Ohio

BRANCHES:

Philadelphia, Pa.
Chicago, Ill.
Bluefield, W. Va.
St. Louis, Mo.



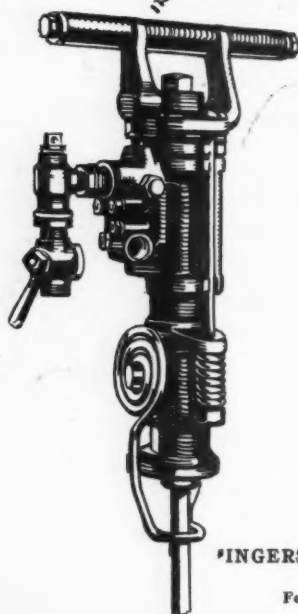
Pittsburgh, Pa.
Wilkes-Barre, Pa.
Pottsville, Pa.
Miami, Fla.

GRASSELLI EXPLOSIVES

ONE "JACKHAMER" EQUALS SIX HAND DRILLERS



A Mechanical Age



The "pick and shovel" coal miner of the olden days has been cast in a new role. Mechanical progress has taken from him those slow-acting, back-breaking tools and has placed in his hands a pneumatic servant that instantly does his bidding.

Present-day mining demands greater production at lower cost, and the "Jackhammer" is helping to meet this demand.

Equal in capacity to six hand-turned auger drills, this air-driven tool is safe, dependable, and easy to operate. In addition, it is so ruggedly constructed that it will stand up in continuous hard service at a very small upkeep cost.

The "Jackhammer" is making imposing records in many mines



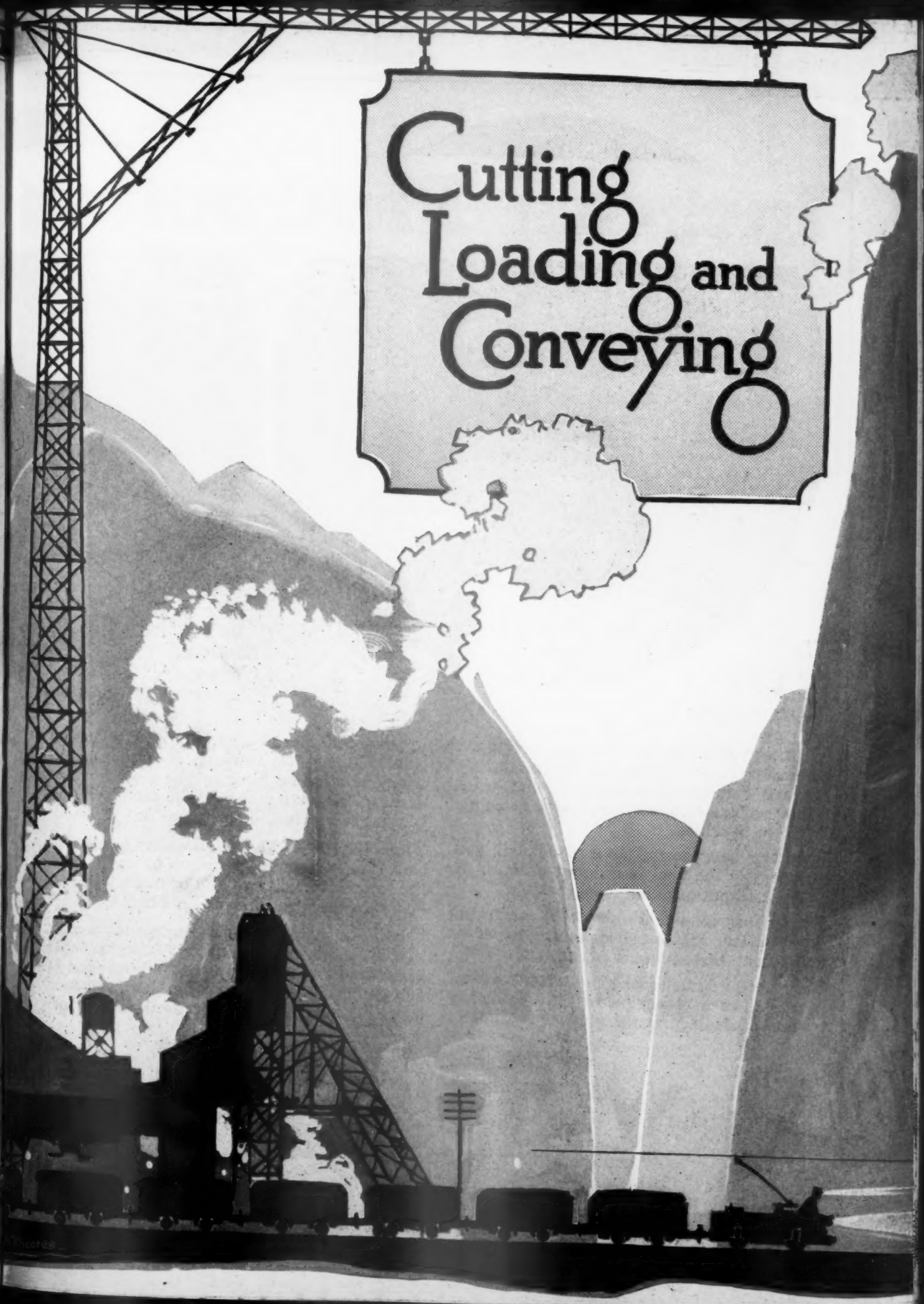
INGERSOLL-RAND COMPANY, 11 Broadway, New York City
Offices in principal cities the world over
For Canada Refer—Canadian Ingersoll-Rand Co., Limited,
10 Phillips Square, Montreal, Quebec

Ingersoll-Rand

318-JD

TO

Cutting Loading and Conveying



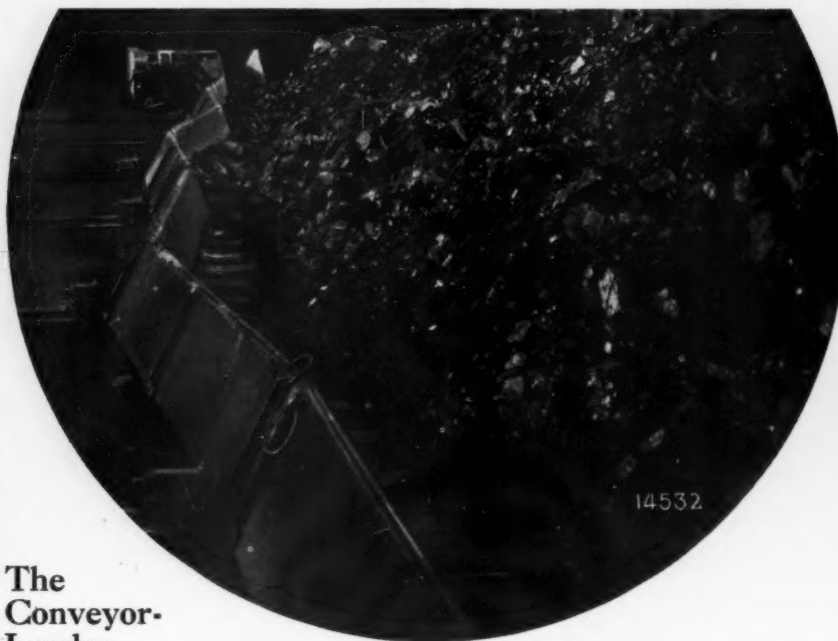
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Increase Production-L



**The
Conveyor-
Loader**

Note the flexible outline



**The
Sectional
Conveyor**

No piling or spilling on sharp up grades

Whether you are interested in increasing production or reducing the cost of your present tonnage, Jeffrey equipment for concentrated mining offers two savings that you cannot afford to overlook.

First, the direct cost of labor to cut, drill, load and convey the coal is reduced because the average output per man is increased.

Even after ample allowance is made for depreciation, maintenance, and interest on investment, this saving is considerable.

The second and equally important saving results from a reduced cost for ventilation, trackage, keeping haulage ways open, timber-

ing, inspection, and other items of overhead cost. Cutting the working area to a small fraction of that required for the same tonnage under ordinary methods make this saving in general maintenance cost possible.

THE SHORTWALLOADER cuts, loads, and conveys—it stays in one room or entry until the coal is worked out, and operates continuously except while the coal is being shot.

Coal is undercut in exactly the same manner as with a shortwall machine. After the coal is shot the Shortwaloader is again sumped in and the coal loaded out. The Shortwaloader usually discharges into a Sectional Conveyor.

The Jeffrey Manufact

958-99 North Fourth St. C

New York

Philadelphia

Pittsburgh

Scranton, Pa.

Charleston, W. Va.

SALES AND SERVICE S

Pittsburgh, 600 2d Ave. Salt Lake City, 153 W. 2d South St. Terre Haute, Ind., 319 Cherry St. Birmingham

T H E R O A D T O M E C

Lower Tonnage Cost



The Short-waloder
Cuts—Loads—Conveys

THE SECTIONAL CONVEYOR provides an efficient method of carrying the coal to the entry where a sufficient number of mine cars are waiting to haul it away. A steady even pull, up grade or down, is an important feature of the Sectional Conveyor.

The sections are made in 6 ft. lengths to follow the steady advance of the cutting machine.

The Sectional Conveyor is also used as an intermediate conveyor in long face mining where it receives the coal from the Conveyor-Loader.

THE CONVEYOR-LOADER is the narrowest conveyor available for loading coal on long faces. It permits close timbering, thus reducing the uncertainties of roof control.

This conveyor cannot be overloaded. The coal can be shot directly onto it. More than half the coal is loaded out without hand shovelling. Its design is flexible, allowing the irregular contour of the shot coal to be followed closely.

Bulletin 425-A completely describes these and other Jeffrey Concentrated Mining Equipments. We will be glad to send you a copy.

Manufacturing Company

St. Columbus, Ohio

W. Va.

Chicago

Denver

Salt Lake City

Birmingham

Montreal

D SERVICE STATIONS

Birmingham, 26 S. 20th St.

Winchester, Ky., 122 N. Main St.

Scranton, Pa., 122 Adams Ave.

MECHANIZATION

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Features of the Governor 35-B Shortwall

Centralized Control

Centering all the controls at the left rear corner of the Jeffrey 35-B Shortwall Coal Cutter enables the machine runner to guide the cutter with his right hand.

This leaves his left hand free to lay skids as the cutter advances.

In low coal this centralized control saves crawling around the machine on hands and knees, adding to the comfort and safety of the machine runner and gaining valuable production time.

Fewer Gears Than Any Other Shortwall Cutter

This feature of the Jeffrey 35-B Shortwall makes possible the use of larger gears, shafting and bearings and provides easy and proper lubrication of all parts, insuring longer life and greater dependability.

Accessibility of wearing parts permits making repairs right at the coal face in a remarkably short time. The machine is so designed

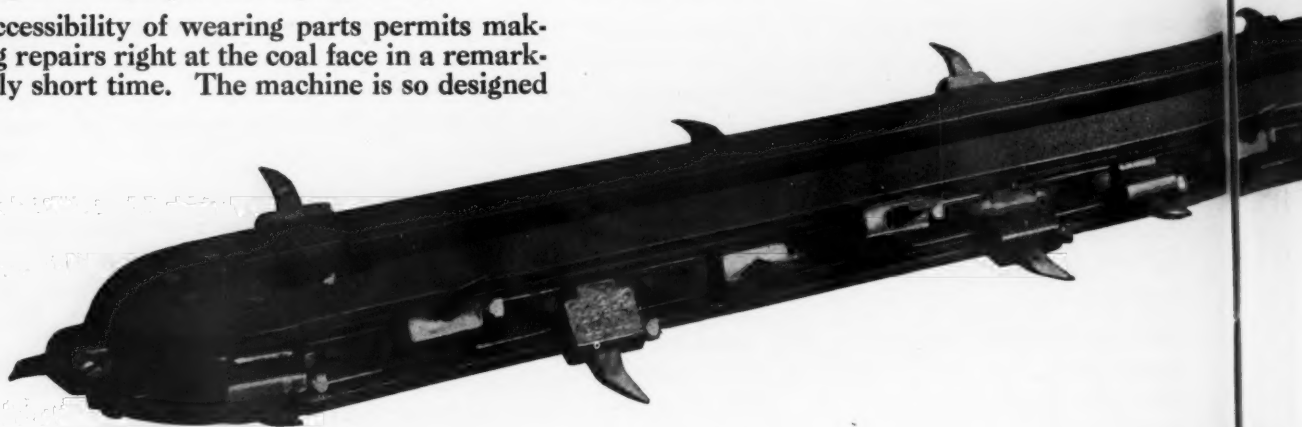
that only the worn part need be removed, thereby reducing upkeep, labor, and delay in production to a minimum.

Power Available on Both Rope Drums at the Same Time

The rope drums are independently operated and both may be operated at the same time, making only one setting of the jacks necessary. Each drum has variable speed control.

Quicker sumping and handling of the machine is possible. The cutting angle can be instantly adjusted to make the cutter bar follow the rib line closely.

This speeds up dodging and cutting around impurities met in cutting across the face and allows the chain to grip the left rib in completing the cut.



The Jeffrey Manufacturing Co.

958-99 North Fourth St.

New York

Philadelphia

Pittsburgh

Scranton, Pa.

Charleston, W. Va.

SALES AND SERVICE

Pittsburgh, 600 2d Ave. Salt Lake City, 153 W. 2d South St. Terre Haute, Ind., 319 Cherry St.

THE ROAD TO MECHANIZATION

Government Approved Short-wall Coal Cutter

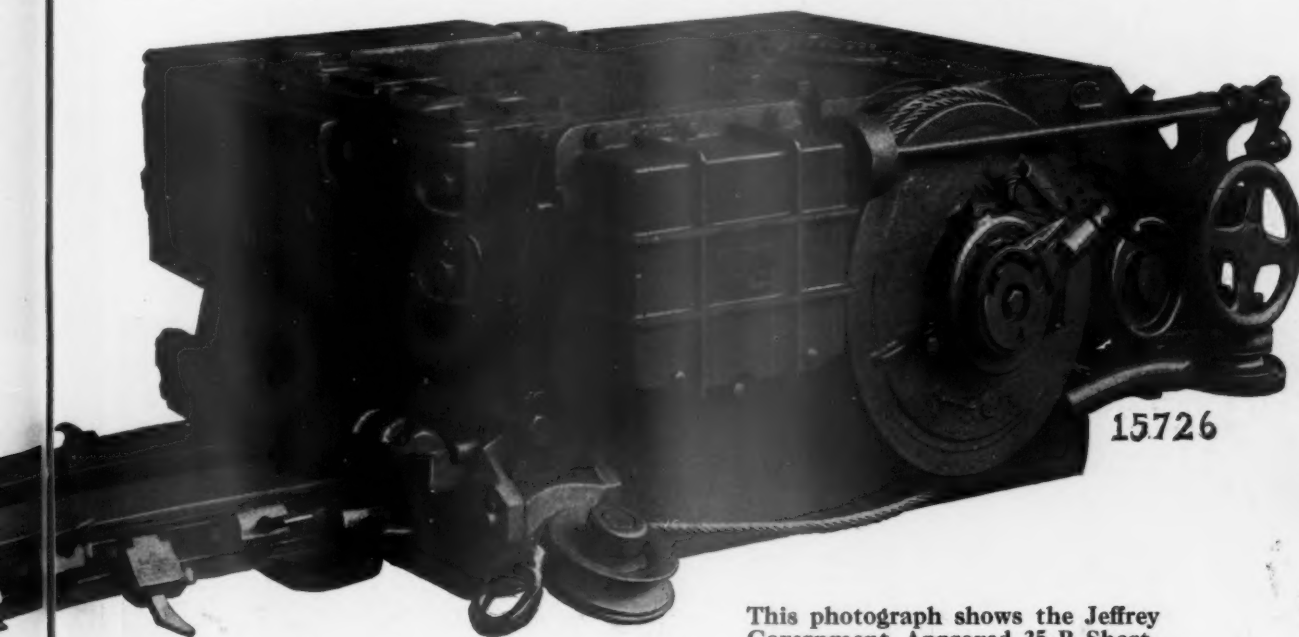
Power Operated Permissible Handitruck

A self-propelling Handitruck saves time in unloading, loading and moving the machine between places.

One man can easily turn the cutter on the turn-table to any desired angle. The Handi-

truck is especially advantageous in unloading and loading the machine where the gob lies close to the face, or where the room is closely timbered.

For low coal a Handitruck having a limited swing of its turntable can be furnished. In extremely low coal a special Handitruck that does not swivel, is available.



This photograph shows the Jeffrey Government Approved 35-B Short-wall Coal Cutter with cutter bar guard pushed back.

Manufacturing Company
St., Columbus, Ohio

Chicago Denver Salt Lake City Birmingham Montreal

VICE STATIONS

Birmingham, 26 S. 20th St. Winchester, Ky., 122 N. Main St. Scranton, Pa., 122 Adams Ave.

COLODER

Production Records

These records were made in a group of 8 mines where Coloders were first used

| | 1924 | 1925 | 1926 |
|-----------------------------|---------|---------|---------|
| Number of Coloders | 22 | 22 | 22 |
| Total number of shifts . . | 5495 | 5944 | 6501 |
| Capacity of mine cars . . . | 3.37 | 3.59 | 3.56 |
| Average tons per shift . . | 277 | 287 | 286 |
| Total net tons loaded . . . | 1682000 | 1709000 | 1862000 |
| Cost per ton, repair parts | \$.030 | \$.031 | \$.029 |
| Cost per ton, repair labor | \$.005 | \$.002 | \$.002 |



The COLODER



A STEADY FLOW OF COAL
from the face to railroad car! The dream—the ideal of the mine manager.

Watch the flow of coal on a big belt conveyor: endless—continuous.

Watch the flow of coal as a big trip of modern pit cars speeds by on a real railroad.

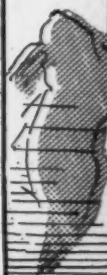
Watch the rapid flow of coal from face to pit car through a Coloder: effortless—continuous—quiet.

A dream realized! An ideal attained!

The Coloder Company, Inc.

568 North Fourth St.

COLUMBUS, OHIO



Tracy's Koalveyor

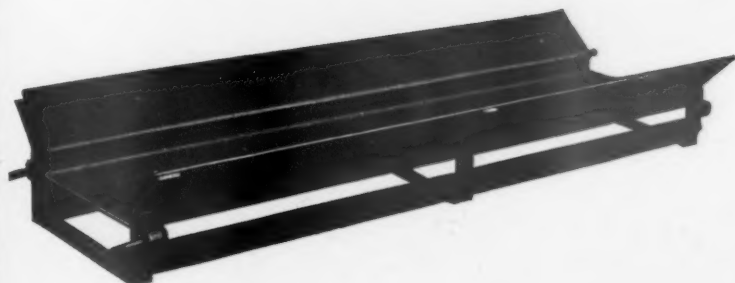
MAIN CONVEYOR
SEE IT AT THE
CINCINNATI COAL SHOW



FACE CONVEYOR
DRIVEN FROM TAIL END OF
MAIN CONVEYOR

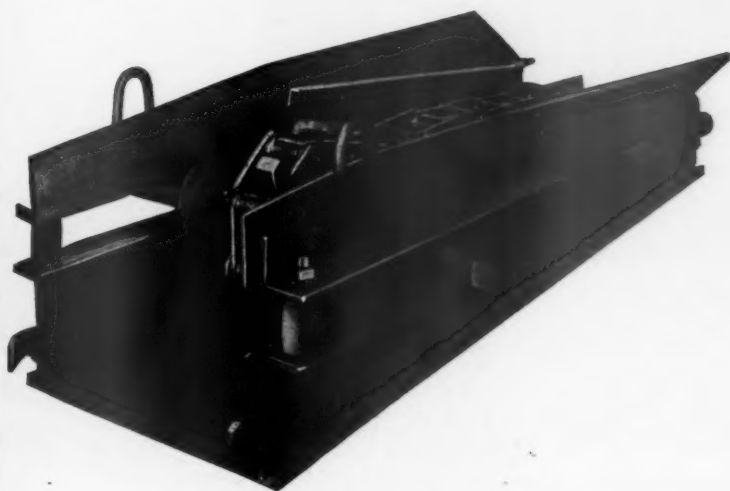
Bertrand P. Tracy Co.,

Tracy's Koalveyor



PAN SECTION
STANDARD LENGTH 6 Ft.

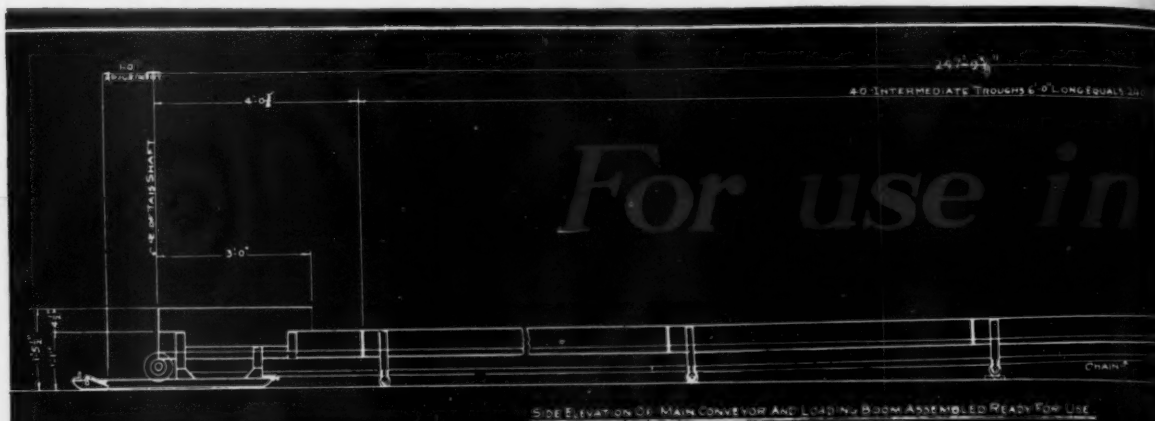
INTERMEDIATE
DRIVING SECTION,
INTERCHANGEABLE
WITH PAN SECTIONS,
FOR LOCATING
LATERAL CONVEYORS
AT ANY POINT ON
MAIN CONVEYOR



TAIL END SECTION
SHOWING SHAFT
EXTENSION FOR
DRIVING FACE
CONVEYOR

INQUIRIES SOLICITED
OUR ENGINEERS ARE AT YOUR SERVICE

Pittsburgh, Pa.



Belt Face conveyor discharging onto main conveyor in a 26-inch seam of coal.

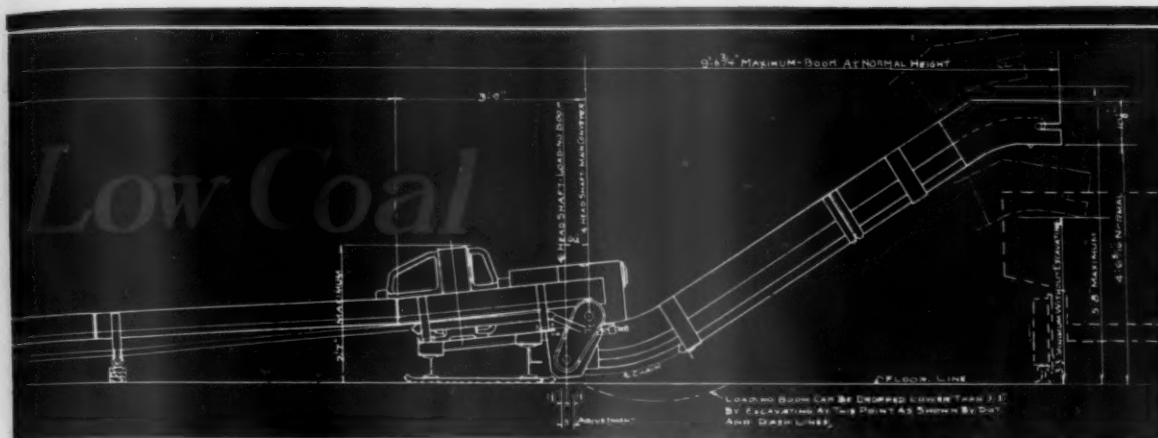
Views showing installations of the Lorain conveyor. At the left is shown the main conveyor as it comes from the face. At the right is shown the loading boom discharging onto mine cars. This also shows how little roof needs to be brushed when working in a low seam.

We build all types of mine cars—steel and composite. They are sturdy and easy rolling. This car is equipped with Timken bearings



The LORAIN

THE ROAD TO MECHANIZATION



LORAIN CHAIN CONVEYORS are light and unusually efficient and sturdy. Their advantages are particularly exhibited by their performance in low coal or under difficult mining situations. They are 13 inches high and require no pan for the return strands of the chain, rollers that act as idlers being provided between the supports. In low coal the roof does not need to be brushed for the conveyors except at the point of discharge of the loading boom. Reversibility allows material to be carried to the face. Dead work is greatly reduced and mining concentrated, since for a given tonnage only a fraction of the rooms necessary with hand mining need be developed.

The use of Lorain conveyors reduces labor, the working area, the number of gathering locomotives required, and insures greater safety, closer supervision, higher recovery and better preparation; and it makes possible and practical the mining of much coal that would be otherwise inaccessible.

See our large exhibit at Cincinnati---Booths Number 109, 110, 111, 112 and 113---or write to us for further information.

Sales Offices:

Atlanta
Chicago
Cleveland
Dallas
New York
Philadelphia
Pittsburgh

Pacific Coast Representative:

United States Steel Products Company
Los Angeles Portland Seattle
San Francisco

Export Representative: United States Steel Products Company, New York, N. Y.

Johnstown, Penna.

STEEL CO.

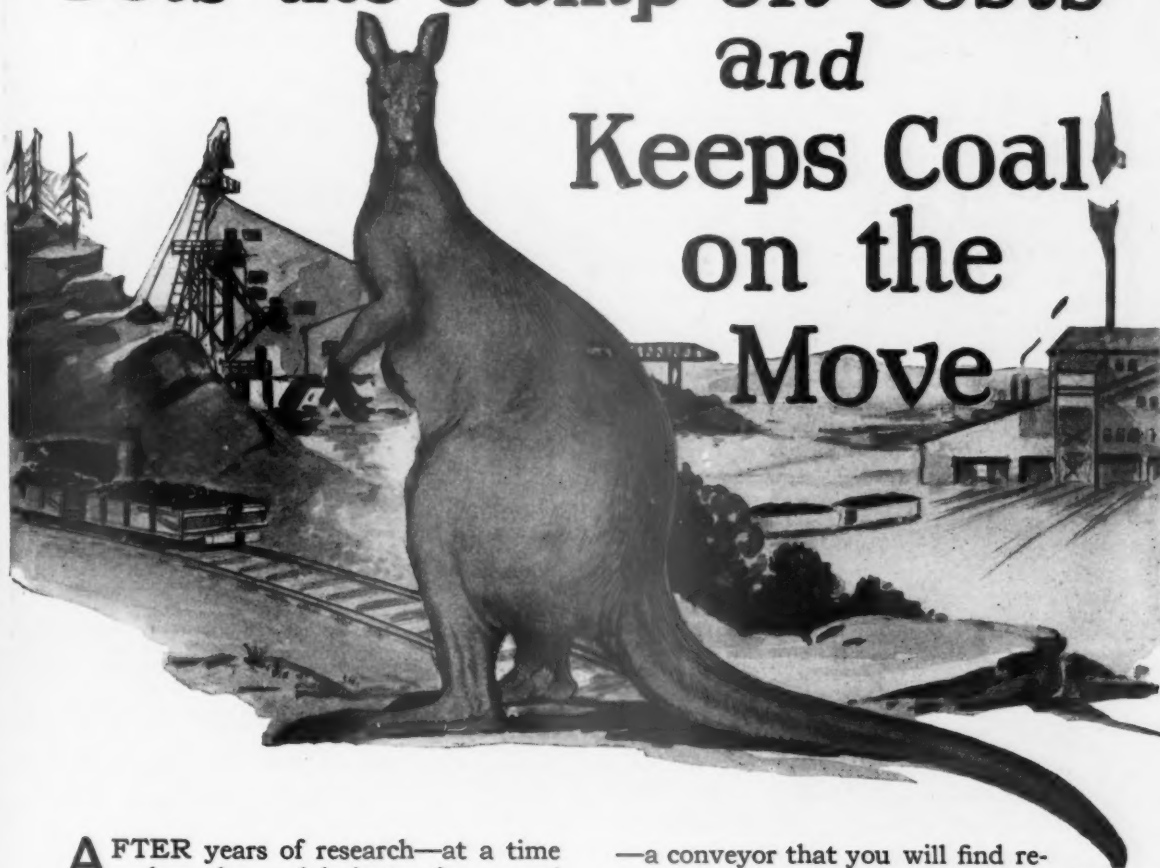
- PROOF!



JOY MANUFACTURING COMPANY
FRANKLIN-PA.

THE ROAD TO MECHANIZATION

The "Kangaroo Konveyor" Gets the Jump on Costs and Keeps Coal on the Move



AFTER years of research—at a time when the coal industry in general is attempting to lower the cost of mining by better methods—and when interest is at top pitch—Link-Belt announces the "Kangaroo (underground) Konveyor"

—a conveyor that you will find responsive to your pet scheme of mining.

Our nearest office will be glad to mail you a copy of a new book containing a full description; ask for Book No. 921.

Coal Tipples
Coal Washeries
Loading Booms
Picking Tables

Screens
Retarding Conveyors
Car Dumps, Car Hauls
Crushers

Boom Hoists
Locomotive Cranes
Crawler Cranes
Portable Loaders

Vibrating Screens
Face Conveyors
Spiral Separators
Manierre Box Car Loaders

Conveyors of Every Type
Chains, Wheels, Buckets
Silent Chain Drives
Roller Chain Drives

LINK-BELT COMPANY

3044

Leading Manufacturers of Elevating, Conveying, and Power Transmission Machinery and Chains

PHILADELPHIA, 2045 Hunting Park Ave.
Pittsburgh - - - - - 335 Fifth Ave.
St. Louis - - - - - 3638 Olive St.

CHICAGO, 300 W. Pershing Road
Wilkes-Barre - 826 2nd National Bank Bldg.
Huntington, W. Va. - Robson-Prichard Bldg.

INDIANAPOLIS, 200 S. Belmont Ave.
Denver - - - - - 520 Boston Bldg.
Birmingham, Ala. - 229 Brown-Marx Bldg.

LINK-BELT

Underground Conveyors

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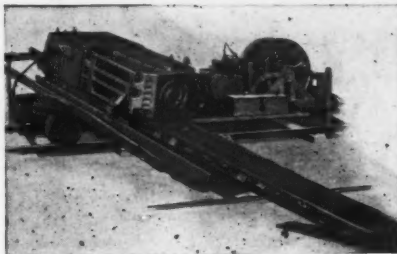
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XUN



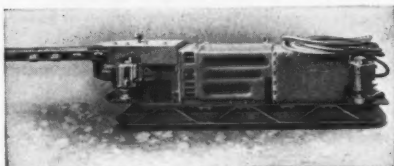
Sullivan Portable Hoist Pulling a Coal Car on a Slope



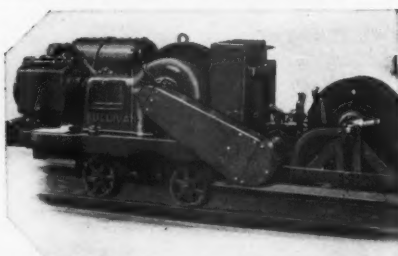
"CE-7" Ironclad unloading from Tipturn Truck



Shearing Ironclad, "CH-11," Sumping



Sullivan Center Band Cutter for Room Mining (CE-11)



"WK-39" Mine Car Air Compressor



Sullivan Roller Bit Sharpener



Anywhere a Man Can Crawl

You Can Cut Coal With This New
12-Inch Model Longwall

Sullivan Ironclad

At Clarinda, Iowa, The Pearson Coal Company is working a 16-inch seam successfully with the new low Longwall Ironclad. The CLE machine mines in the clay beneath the coal. From 800 to 1,000 face feet is the average cutting done with this machine per 8-hour day. The machine is handled by two men.

The photograph shows the machine opposite an entry. Check the height of coal by the prop and the runner's head.

Sullivan Low Ironclads are only 12 inches high, but are full powered, rugged, substantial machines. They are even stronger and sturdier than the older Longwall Ironclad, which was 18 inches high. The new machines actually have a greater cutting capacity and consume less power, and cost less for repairs, per ton, than previous models.

Let us tell you about these remarkable Ironclads at our booth at the Mining Congress. It's No. 106, in the Main Hall.

Sullivan Coal Cutters of many types are at your disposal to help you cut your mining costs as well as your coal. Likewise Sullivan Air Compressors, Drills, Cutter Bit Sharpeners, Hoists, and Diamond Core Drills. Ask for the catalogues.



The Low Model Ironclads are no higher than your weekly magazine

Parts When and Where You Need Them

The Sullivan "Service of Supply" is organized to furnish complete machines, genuine Sullivan parts, or expert mechanical service on short notice when and where they are needed, from the central offices and service stations shown below.

Don't allow your costs to run up by putting substitute parts in Sullivan machines. Insist on genuine Sullivan Repairs.

Birmingham, Ala.
*Claremont, N. H.
Denver, Colo.
Drumheller, Alberta
El Paso, Texas

Huntington, W. Va.
Knoxville, Tenn.
*Michigan City, Ind.
Muskogee, Okla.

Pittsburgh, Pa.
Pottsville, Pa.
Salt Lake City, Utah
St. Louis, Mo.
*Factory

Scranton, Pa.
Spokane, Wash.
Terre Haute, Ind.
Vancouver, B. C.

COMPRESSORS - AIR LIFT - COAL CUTTERS - DIAMOND CORE DRILLS - ROCK DRILLS
PORTABLE HOISTS - *DRILL SHARPENERS AND FURNACES - BUSTERS - SPADERS
SULLIVAN
MACHINERY COMPANY
NEW YORK - LONDON - PARIS - TOKYO - SYDNEY
148 S. MICHIGAN AVE., CHICAGO, ILLINOIS, U. S. A.



The Myers-Whaley Shovel

The All-Around Loader for Underground Work

We invite you to visit our Booth, at the American Mining Congress Exposition at Cincinnati, May 16th-20th. We will also have on exhibit one of our latest Shovels.

Yes! Thank you! MYERS-WHALEY SHOVELS have been in great demand this past year, and are being shipped as fast as built, but a Mining Congress Exhibit would not be complete without a "MYERS-WHALEY" (at least that's what our friends say) so we are exhibiting for the "Steenth" time.

There has been great progress made in the use of MYERS-WHALEY SHOVELS this past year, in all departments of mechanical loading underground. Over 500 tons of coal per day with one Machine (two shifts) is averaged by one mine. Another is loading coal on one shift, rock on the other. Others are doing great work in Heading Driving, Brushing, Grading, etc. And did you know MYERS-WHALEY SHOVELS had broken the World's Record for Rapid Tunnel Driving in Rock—three times in three successive months?

Yes sir! We have a pamphlet telling all about it.

Our representatives will tell you all about it—A Fast Talking Pair—familiar with the operation of MYERS-WHALEY SHOVELS under many different conditions.

Catalog on Request

MYERS-WHALEY COMPANY
KNOXVILLE, TENNESSEE]

"The Pioneer Manufacturers of Coal Loading Machines."



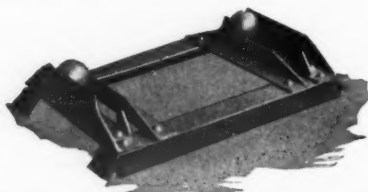
MORE TONNAGE at LOWER COST!

THE M & C line of shaker conveyors includes designs and types for use under practically all mining conditions. For many years the M & C conveyors have been used successfully throughout the coal-producing world. For instance, one large operator succeeded in driving his entries $2\frac{1}{2}$ times faster by use of the M & C shaker conveyor.

Motors used on all M & C conveyors are **dust proof**, thus assuring safe operation as well as contributing to efficiency and long service life. M & C motors were developed and built especially for shaker conveyor service. By actual test M & C motors show a lower consumption of k. w. per ton of coal handled than any other type.

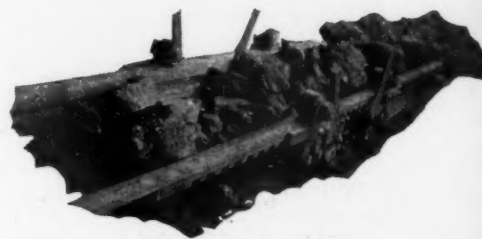
Where desired, M & C conveyors can be furnished only 16 inches in height, with the drive totally enclosed and provided with oil splash lubrication.

See our exhibit at Booth No. 65, Cincinnati Convention, May 16-20.



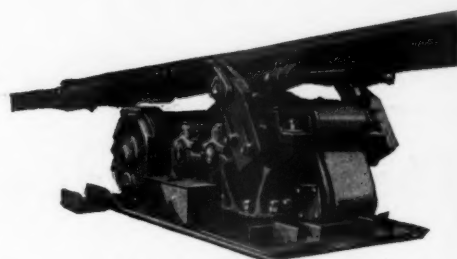
ROLL your coal!

This patented "ball-bearer" is designed particularly for use on level or slight gradients. You may obtain this unit with M & C equipment or for use on your own make conveyor or those built by other manufacturers.



This is the "JIGGER-DIGGER"

Designed to eliminate hand-loading to a large extent. A special feature of this model is a patented arrangement of the shovel which assures positive pick-up and movement of the coal back to the conveyor proper. The "jigger" has a 9-ft. advance thrust.



Double Arm Shaker Conveyor

For use in seams where height of coal will permit, the double arm shaker assures a more equalized action of the conveyor. This model is the only double arm conveyor on the market today.



Side drive—only 23 inches high

For application in low coal this model is only 23 inches high. It permits recovery of low seam coal without necessity of taking up bottom or brushing roof.

C. H. McCullough Engineering Company

Oliver Building

Pittsburgh, Pa.

Representing

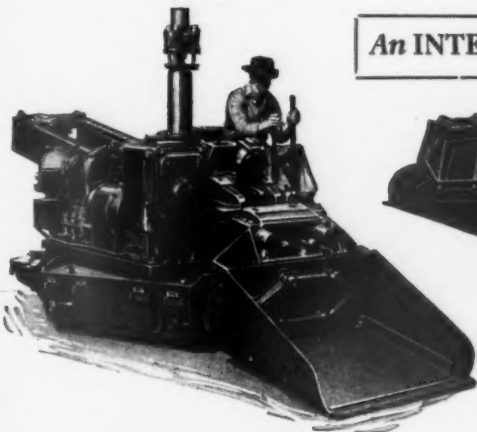
MAVOR & COULSON, LTD.

M & C SHAKER CONVEYORS

M & C Shaker Conveyors are built by MAVOR & COULSON, for more than half a century designers and builders of coal mining equipment.

LOADERS --- TWO TYPES

An INTERESTING EXHIBIT for YOU at CINCINNATI

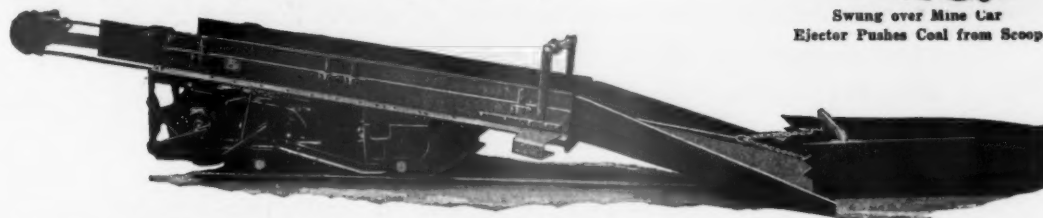


Ready to Pick up a Load

The Electro-Hydraulic Power Shovel



Swung over Mine Car
Ejector Pushes Coal from Scoop



The "Entryloader"

The Machine Remains in the Room Neck

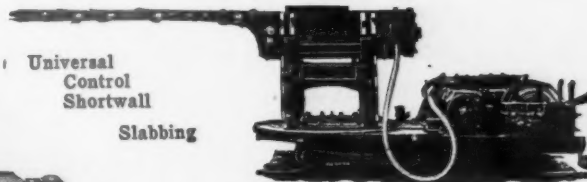
Only the Scoop Goes to the Room Face

CUTTERS --- SEVEN TYPES



Universal Control Shortwall

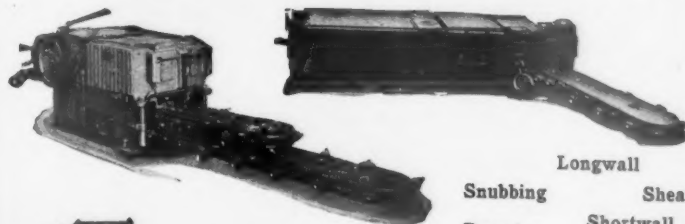
Slabbing



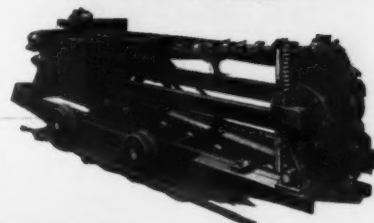
Longwall

Snubbing

Breast



Shortwall Low Vein



(68)

GOODMAN

Locomotives - Loaders - Coal Cutters

MANUFACTURING COMPANY
HALSTED ST. at 48TH
CHICAGO --- ILL.

PITTSBURGH - CHARLESTON, W. VA. - HUNTINGTON, W. VA. - CINCINNATI - BIRMINGHAM - ST. LOUIS - DENVER - PRICE, UTAH

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MINING *and* LOADING EQUIPMENT

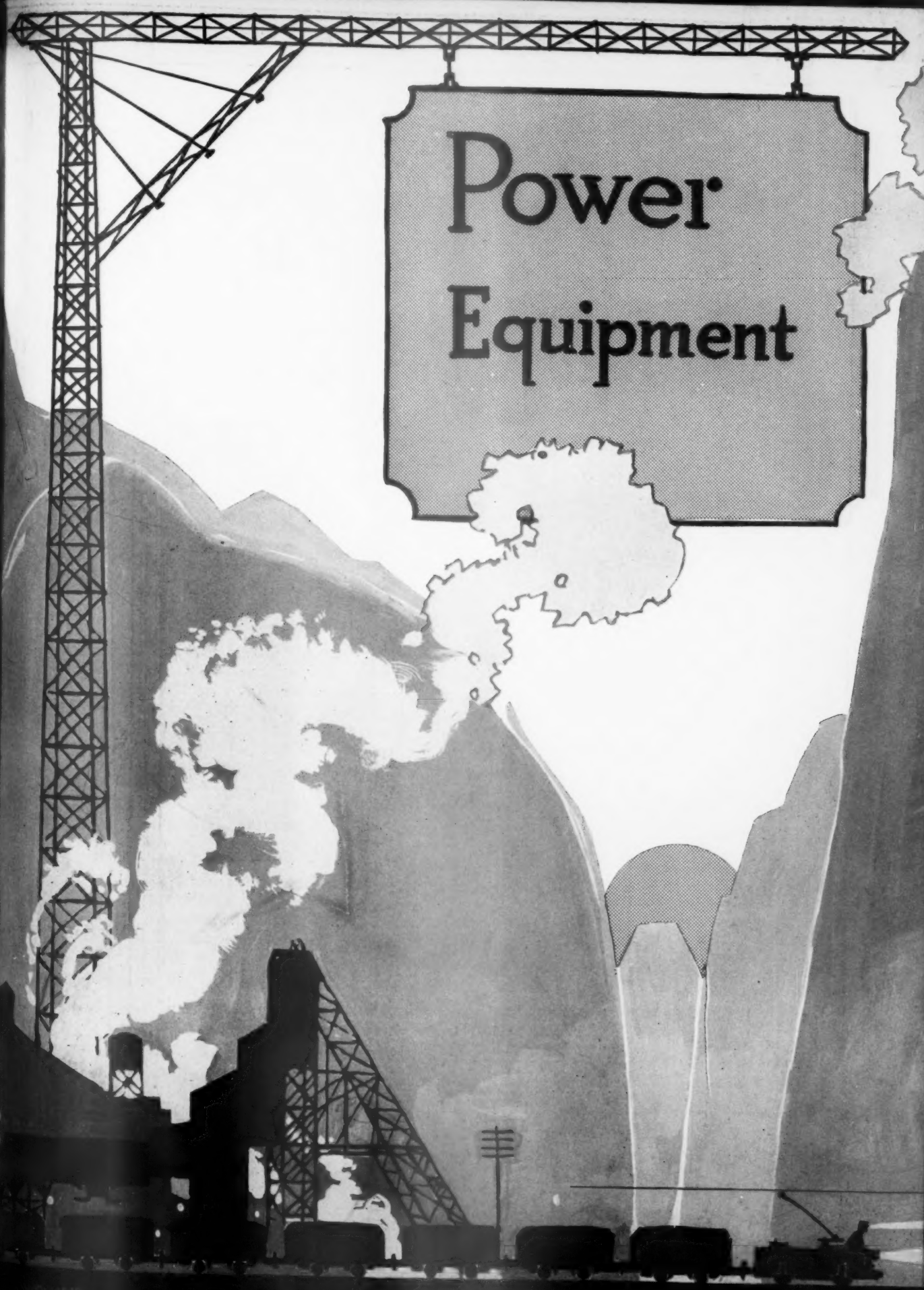
THIS part of the Handbook consists of preliminary recommendations upon these important subjects. Supplementary recommendations will keep this section current and make available the rapidly increasing knowledge upon Mining, Loading and Conveying topics.

An important development of this work is the investigative survey of mechanized mining that has been undertaken by The American Mining Congress. The immediate object of this investigation is to make a comprehensive survey of important mechanical loading and conveyor mining installations and to make available through The Mining Congress Journal and Standardization Committee reports the diverse knowledge upon these subjects.

The scope of this work is further outlined in an article on page 346 of this issue.

An order for the Handbook carries with it a subscription to the Mining Congress Journal and keeps you in touch with developments in loading and conveying. See page 119 of the advertising section.

D T



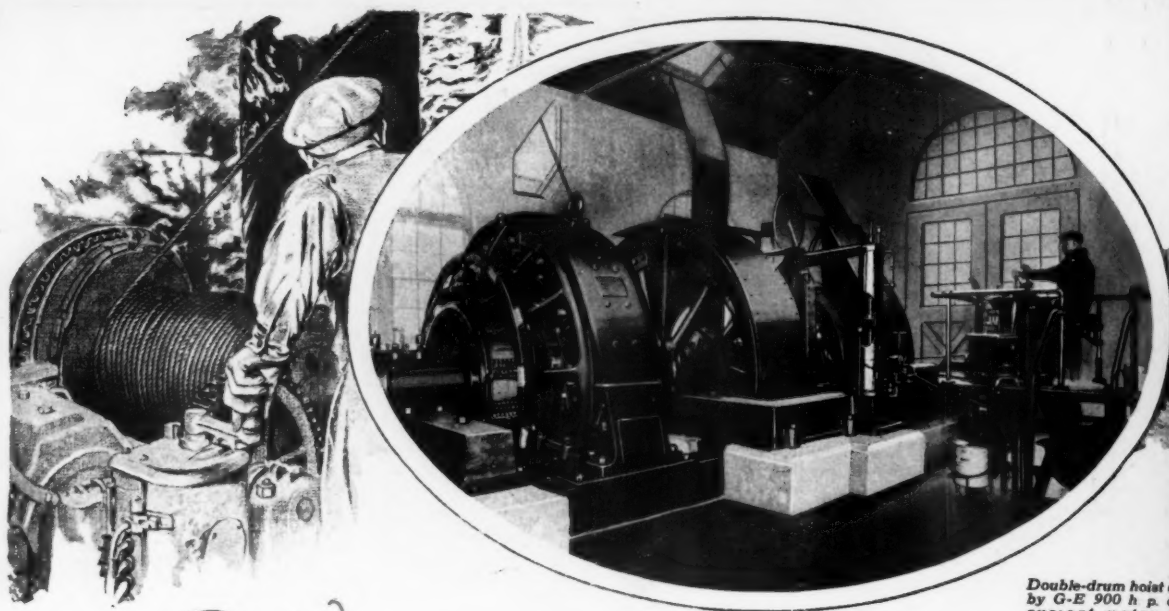
Power Equipment

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XUM



Double-drum hoist driven by G-E 900 h. p. direct-current motor, Island Creek Coal Company.

Hoisting-

The Gateway to Tonnage

Electrified hoisting places a paramount responsibility upon the motor and control selected. G-E engineers know too, that adequate capacity and proper operating cycles largely determine the advantages derived from the electric hoist—and they carefully work over the varying requirements of every installation. When G-E equipped, electric hoists, both large and small, soon prove their advantages in simplicity and economy of operation, quick adjustability to varying loads, and all-day dependability.

Apply the proper G-E motor and the correct G-E controller to a specific task, following the recommendations of G-E specialists in electric drive and you have G-E Motorized Power. "Built in" or otherwise connected to all types of industrial machines, G-E Motorized Power provides lasting assurance that you have purchased the best.

The co-operation of G-E engineers with hoist manufacturers provides the right motor and control for every type of hoist service. General Electric can help you realize big savings from present obsolete steam hoists by harnessing G-E Motorized Power to the drums of your existing equipment. The dependable performance of G-E Motorized Power is your assurance of an ample gateway to tonnage. Your nearest G-E office will ably serve you.

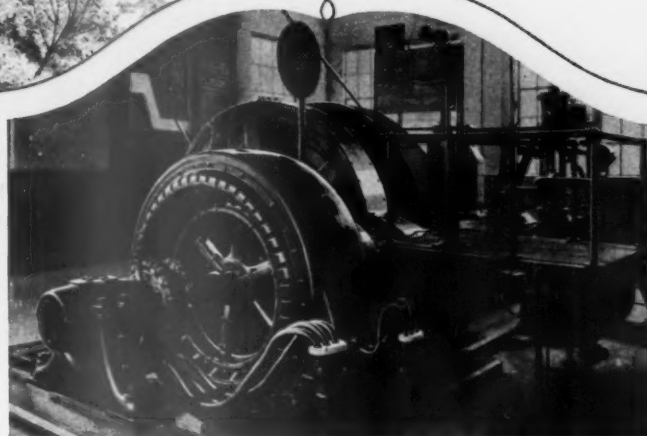


Motorized Power
-fitted to every need

GENERAL

GENERAL ELECTRIC COMPANY, SCHENECTADY, N. Y.

THE ROAD TO MECHANIZATION



G-E 700 h. p. induction motor driving main shaft hoist at mine of the Union Collieries Co. This hoist produces 1000 cars per day from a depth of 540 ft.

HOISTING is only one phase of coal mine operations served by General Electric. Thorough electrification and G-E equipment combine to obtain high unit production and low unit costs also in

Hauling—Pumping—Cutting and Shearing—Loading and Conveying—Ventilation—Rockdusting—Air Compressing—Preparation—Stripping—Power Generation—Power Distribution and Conversion—Etc.

Whatever the need, G-E meets it so dependably and economically that each General Electric installation recommends another.

ELECTRIC
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MECHANIZATION

The True Test of Quality is *Performance*

Nuttall gears have a reputation among mining men for giving an excellent account of themselves. They operate smoothly, with a minimum amount of vibration and noise; and on the toughest jobs they have proved their stamina. Everywhere that gearing is used: on locomotives, on mining machines, on pumps, hoists, conveyors, or fans, Nuttall gears have made service records which have earned them the respect of mine operators. They have proved their quality by their performance.

Other Nuttall products, trolleys, flexible couplings and Nuttall speed reducers and gear units, all bear the same enviable reputation. It is the logical result of the one manufacturing policy of the Nuttall Company for the past forty years—QUALITY ALWAYS.

Send for our "Mine and Industrial Catalog," No. 16

R. D. NUTTALL CO. - Pittsburgh, Pa.

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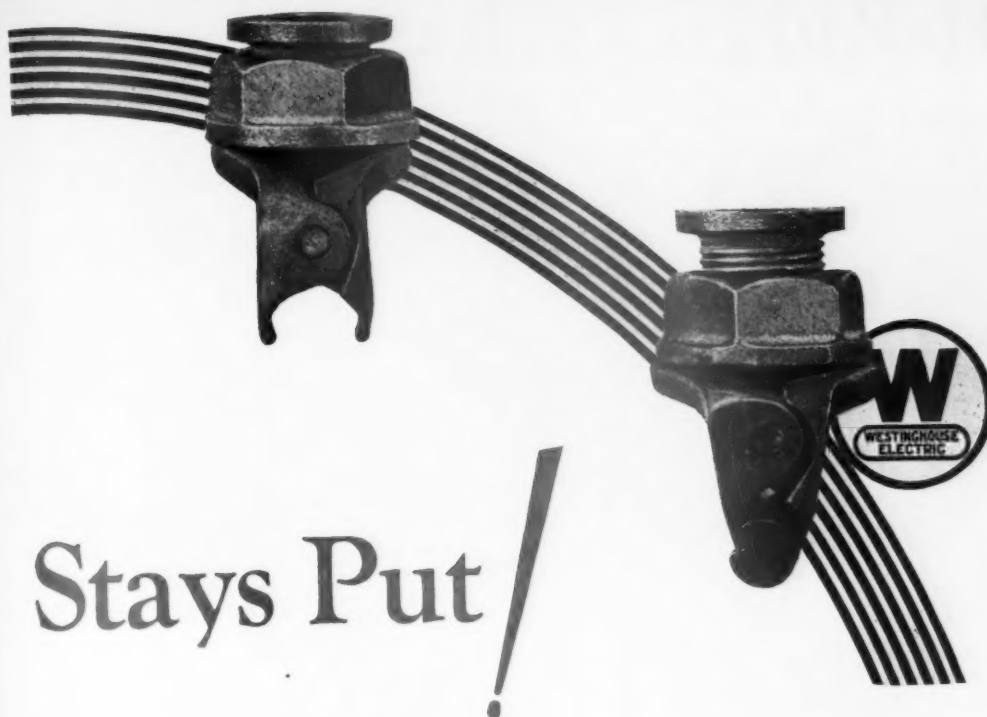
Houston

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A group of Nuttall heat-treated and hardened, mining machine gears.



Stays Put!

OPEN for installation or clamped on the wire, the Heavy Duty Mine Clamp stays put.

The wireman can adjust the wire readily—without fumbling. A spring holds the jaws apart until the nut is turned down, clamping the jaws on the wire.

When clamped on the wire, the jaws *stay put* with a grip that 3800 pounds cannot tear loose. This gripping power comes from the leverage in the jaws. Note the breadth of the clamp under the nut and the short distance from the hinge pin to the jaws; these give leverage—gripping power.

All this gripping power is obtained with ample wheel clearance and low height.

Westinghouse Electric & Manufacturing Company
East Pittsburgh Pennsylvania

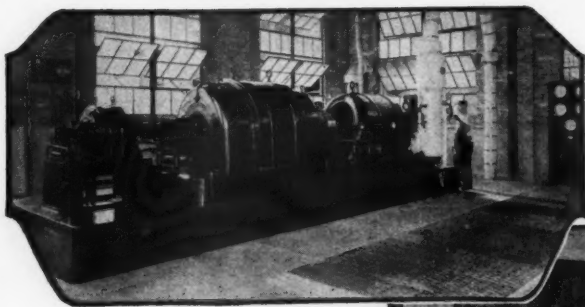
Sales Offices in All Principal Cities of
the United States and Foreign Countries



Westinghouse
Heavy Duty Mine Clamp



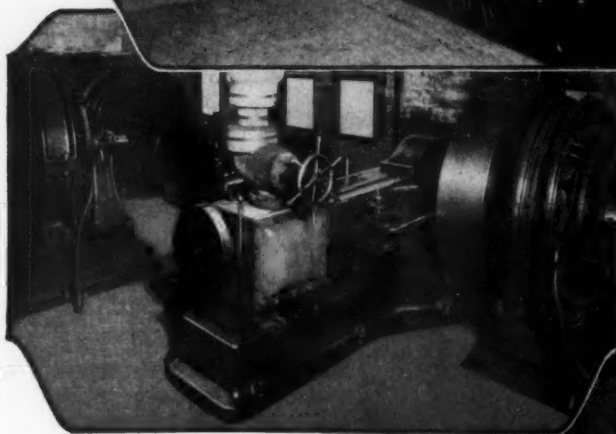
Elliott-Ridgway has already solved your power problem



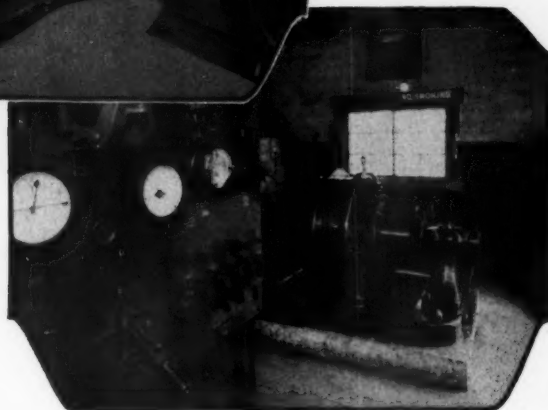
1,000-kw. Mixed Pressure Turbine-Generator Unit, Nason Coal Co., Nokomis, Ill.



200-kw. Motor-Generator Set with Semi-automatic Switchboard, Rose Mine, Wheeling & Lake Erie Coal Mining Co.



Engine room of Wolf Run Coal Co., Amsterdam, Ohio, which contains four 150-kw. Ridgway Single-Valve Engine Generator Sets, and one Three-Machine Booster Set.



200-kw. Synchronous Converter in sub-station at No. 6 Mine of Wheeling & Lake Erie Coal Mining Co., near Lafayette, Ohio.

Some time during our thirty years of experience we have met and vanquished conditions similar to yours.

You may need a complete substation outfit with full automatic control—you may need semi-automatic control equipment—or manually-controlled equipment—or, if you have a good water supply, you may need a steam generator set.

In any case, Elliott-Ridgway engineering advice is unprejudiced and is only interested in furnishing you the equipment—steam or electric—which can generate your power at lowest cost.

If you operate a steam plant, need more power, and have condensing water available, you can nearly double your power output without increase in fuel cost by using a low or mixed pressure turbine.

The former Ridgway Dynamo and Engine Company is now the Ridgway Works of Elliott Company. The Ridgway line of engines, turbines, generators and electrical machinery continues to be built at Ridgway, the experienced engineering, sales and factory force being retained reinforced by the Elliott organization. Elliott-Ridgway brings a broader service in power equipment.

ELLIOTT COMPANY

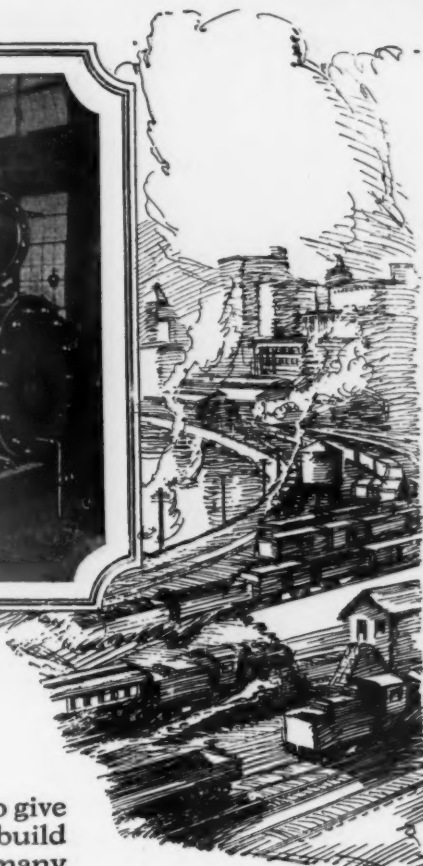
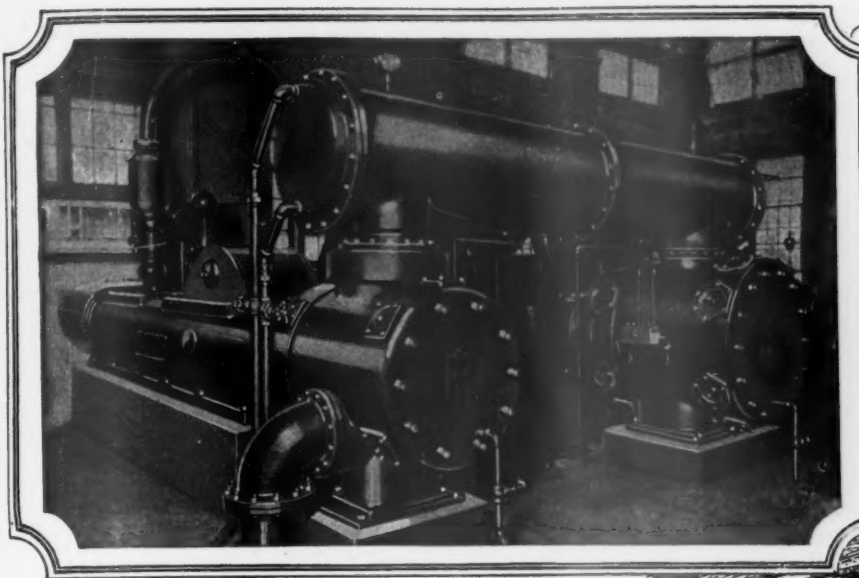
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O-903



Dependability

Ingersoll-Rand Air Compressors are designed to give long-time, continuous service. The men who build and design them have been in the business for many years and have learned, by their own experience, just what is demanded of their machines. They have built them to meet these demands.

All of the material built into I-R Compressors has demonstrated its dependability. The design has stood the test of long years of hard service. The improvement policy has been very conservative, and well it may have been—for the basic design was right. Many years have proved it.

These compressors can be furnished in many different sizes and types of drive. They are adaptable to the needs of any industrial organization and to the individual requirements of any power plant.

Get in touch with one of our representatives. They are trained engineers located in the principal cities of the country, and they are always at your service.



INGERSOLL-RAND COMPANY • 11 Broadway • New York City

Offices in principal cities the world over

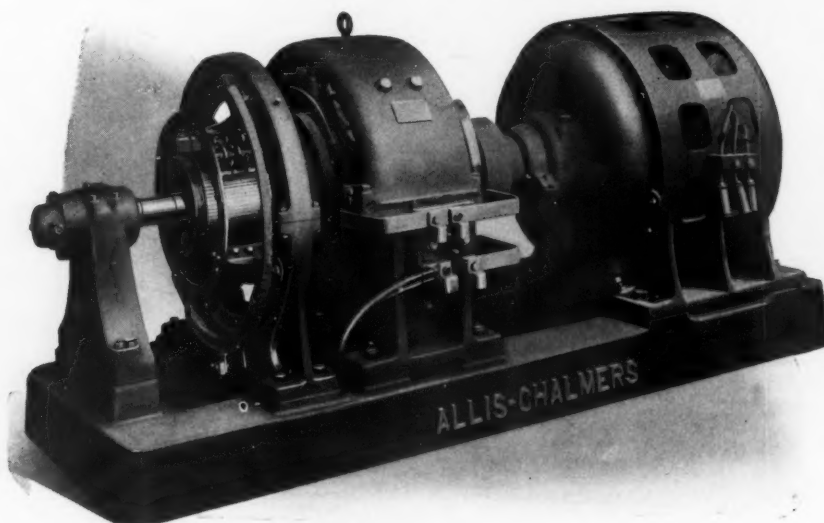
For Canada Refer—Canadian Ingersoll-Rand Co., Limited, 260 St. James Street, Montreal, Quebec

Ingersoll-Rand

831-C



ALLIS-CHALMERS



Synchronous Motor Generator Set

Motor-Generator Sets

ALLIS-CHALMERS Motor Generator Sets are built in all sizes and voltages for various service conditions, such as, transforming from alternating to direct current, from direct current to alternating, from one alternating current frequency to another and from one direct current voltage to another.

Automatic Sub-Station

A 150 kw. Automatic Sub-station
will be shown in operation at the
National Exposition Coal Mine Equipment
Cincinnati, May 16-20
Booths 23 and 24



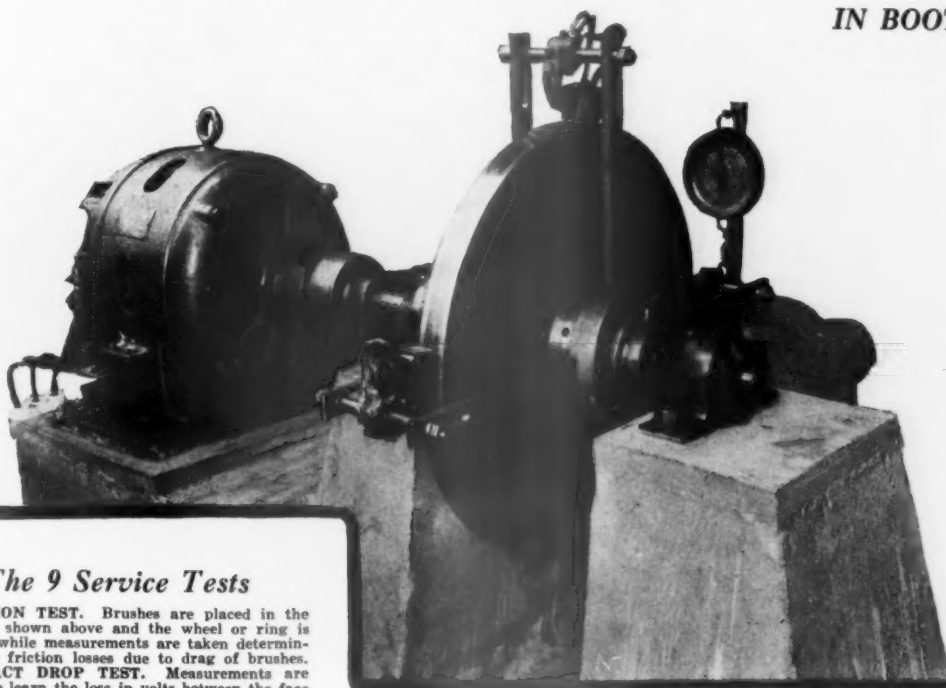
PRODUCTS:

Electrical Machinery
Gas Engines
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Condensers
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Centrifugal Pumps
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Farm Tractors
Power Transmission Machinery

ALLIS-CHALMERS MANUFACTURING CO.
MILWAUKEE, WIS. U.S.A.

Service TESTS for CARBON Brushes

IN BOOTH 224



The 9 Service Tests

1. **FRICITION TEST.** Brushes are placed in the holders shown above and the wheel or ring is driven while measurements are taken determining the friction losses due to drag of brushes.
2. **CONTACT DROP TEST.** Measurements are made to learn the loss in volts between the face of the ring and the brush under test.
3. **SATURATION TEST.** This test determines the carrying capacity of any particular grade of brush—the allowable saturation per square inch of a given brush composition.
4. **ABRASIVITY.** This machine determines the effects of various amounts of abrasive in compositions when run upon commutating surfaces in wearing away mica segments of commutator.
5. **LIFE AND HARDNESS.** Length of life in kilowatt hours per lineal inch of brush is determined by running machine at a given speed with a given pressure applied to the brushes, while a potential equal to any given machine is applied to the terminals of the brushes. The amount of current flowing through a brush largely determines its speed of wearing away. Hardness is measured by the scleroscope—an instrument recording relative hardness.
6. **PERIPHERAL SPEED.** The peripheral speed in feet per minute for a given brush composition is the maximum speed at which it is permissible to operate. This involves the surface speed, the tension or pressure of the springs holding the brush on ring surface, the current carrying capacity of the brush, the draft through a machine and all other determinants of the coefficients of heat and friction.
7. **SPECIFIC RESISTANCE.** This is the resistance in ohms from one face to the opposite face of a cube whose sides are one inch long.
8. **STRENGTH.** Transverse strength is computed in pounds per square inch by a breaking test upon specimens of uniform size.
9. **BRUSH PRESSURE.** This is given in pounds per square inch of brush contact surface. Increase in brush pressure causes an increase in friction, but gives a lower contact drop. The proper compromise of these factors is important. Get our figures for your particular needs.

THERE need be no more guessing in assigning grades of carbon brushes for your needs. To convince users of brushes of the science and care necessary in preparing carbon brushes for this important purpose we are installing this Ring Testing Machine at the Cincinnati Exposition. It demonstrates the tests that our products must pass before they are furnished to our customers. And it is a practical guarantee of the scientifically prepared product you may expect when you install Boxill-Bruel Brushes. For further information write to us or see our exhibit at Cincinnati.

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2126 Farmers Bank Bldg.

NEW YORK
507 Fifth Avenue

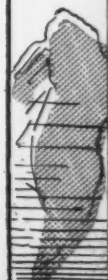
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SHREVEPORT
Bennett Sales Co.

BIRMINGHAM
General Machinery Co.

☸ BOXILL-BRUEL CARBON Co. ☸

CINCINNATI, OHIO



OPERATING COMPANY
 The
 Peenskill, New York.
 Plant #1.

Date August 10, 1935.

BRUSH DATA SHEET

NATIONAL CARBON COMPANY, INC.
CLEVELAND, OHIO

Sheet #1

| ITEM No. | MACHINE UNIT | LOCATION | MANUFACTURER | SERIAL No. | TYPE | RATING | VOLTS | AMPERES | R.P.M. | UNDERCUT COMBULATOR | BRUSHES PER SET | SIZE | GRADE | BEVELS | SHUNT | LENGTH OF SHUNT | TERMINALS |
|----------|--------------|--------------|--------------|------------|------|----------|-------|---------|--------|---------------------|-----------------|----------------------|-------|--------|-------|-----------------|-----------|
| 1. | #6 | Bldg. G.P. 1 | Crocker | 235471 | COM | 7 1/2 HP | 230 | 28.5 | 675 | no | 4 | 2 x 1-5/16 x 3/8 | 401 | | | | |
| 2. | #8 | " " | Wooler | 1329569 | 80L | 15 HP | " | 55.3 | 1100 | " | 8 | 2 x 1-1/4 x 3/8 | 255 | | | 15-02 | 3-1/2" |
| 3. | #1 | Bldg. #6 | G.E.Co. | 29674 | CE | 5 HP | 220 | 17.5 | 1070 | " | 4 | 1-3/4 x 1-1/4 x 3/8 | 401 | | | | |
| 4. | #3 | " " | " | 29614 | " | " | " | " | " | " | " | " | " | | | 15-02 | 3-1/2" |
| 5. | #2 | " " | W.H. | 1317204 | SK | " | 230 | 19.4 | 1100 | " | " | 1-1/2 x 1 x 1/4 | 255 | | 80 | " | " |
| 6. | #4 | " " | Crocker | 105407 | " | 7 1/2 HP | " | 26.6 | 660 | " | " | 2-1/4 x 1-7/16 x 3/8 | 401 | | | | |
| 7. | #7 | " " | Wooler | 29613 | CE | 5 HP | " | 17.5 | 1070 | " | " | 1-1/4 x 3/8 | 255 | | 65 | 15-12 | " |
| 8. | #30 | " " | G.E.Co. | 400836 | CVC | 3 HP | " | 11.7 | 1100 | " | " | " | 255 | | 70 | 15-02 | 5-1/2" |
| 9. | #14 | " " | " | 20581 | W.P. | 20 HP | 250 | 66 | " | " | " | " | " | | " | " | " |
| 10. | #6 | " " | W.H. | 1084625 | R | 1 HP | 230 | 4.1 | " | " | " | " | " | | " | " | " |
| 11. | #8 | " " | " | 1084624 | " | " | " | " | " | " | " | " | " | | 70 | 5-12 | 3-1/2" |
| 12. | #10 | " " | " | 1084625 | " | " | " | " | " | " | " | " | " | | " | " | " |
| 13. | #2 | " " | Sprague | 210457 | C | " | " | " | " | " | " | " | " | | " | 5-02 | 5-1/2" |
| 14. | #5 | " " | " | 210458 | " | " | " | " | " | " | " | " | " | | " | " | " |
| 15. | #8 | " " | G.E.Co. | 28639 | CV | " | " | " | " | " | " | " | " | | " | " | " |
| 16. | #10 | " " | " | 28400 | " | " | " | " | " | " | " | " | " | | " | 12 | 3-1/2" |
| 17. | #12 | " " | " | " | " | " | " | " | " | " | " | " | " | | " | " | " |
| 18. | #14 | " " | " | " | " | " | " | " | " | " | " | " | " | | " | " | " |

"I wouldn't part with this record for a lot of money"

"It's the quickest, surest and safest way I know of ordering carbon brushes. The brush requirements for every motor and generator in the plant are listed here. The National Carbon Company, who prepared this Master Brush Data Sheet for me, have a duplicate copy.

"When I need brushes for any machine I just wire, write or phone to send brushes for Item so-and-so. No other specifications are necessary. The brushes arrive promptly, they fit, and they work right. No more hurried chasing through catalogs, reading name-plates of machines or looking up data of any kind. I do not even have to measure the old brushes.

"The National Carbon Brush Data Service has solved one of my most troublesome problems. I can now sit here at the desk and order brushes for any machine in the plant.

"I always keep a reserve stock of brushes on hand for all the important machines in the plant and use the item numbers on this Data Sheet

for my stock records. This Data Sheet System works like a charm. Expensive tie-ups are a thing of the past with me. My machines are working at higher efficiency than ever before.

"No, sir, I wouldn't part with this record for a lot of money."

A National Carbon Company Sales Engineer is ready to help you at any time. He will make a complete and thorough inspection of your machines and we will supply you with a Master Brush Data Sheet listing all your brush requirements.

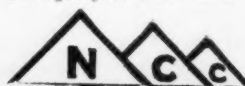
Thousands of industrial plants and public utilities are taking advantage of our Data Sheet Service. It saves them time. It saves them money. It saves them trouble. Let us explain to you in more detail the advantages this service holds for you.

National Pyramid Brushes

Emergency Service Plants

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PITTSBURGH, PA.
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357 West 36th St.
Phone: Lackawanna 8153

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NATIONAL CARBON COMPANY, INC.
Cleveland San Francisco
Unit of Union Carbide and Carbon Corporation

MARTINDALE MOTOR MAINTENANCE EQUIPMENT

Martindale "Imperial" Undercutter

Simple to Adjust

Rapid, Clean Cutting

Without Vibration

Will cut either "V" shaped or "U" shaped slot



Fills a long-felt want for a Motor Driven Slotter that will cut "V" shaped slot.

Advantages of "V" shaped slots

Self-Cleaning at all times.

Automatically prevents cutting too deep.

Eliminates short circuits between bars and "flash-overs."

Martindale Slot Cleaning Outfit

THE NEW WAY:

WITH GRINDING DISKS

(Flexible and Non-Breakable)

Requires Far Less Time.

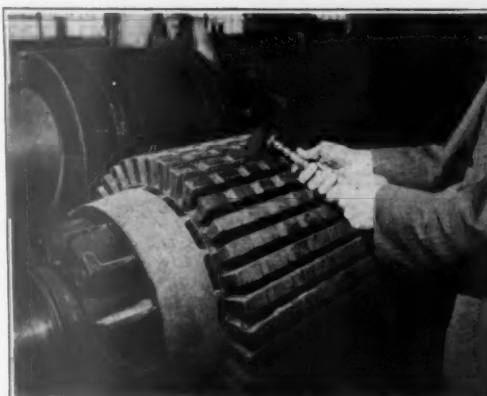
Removes Burns Easily.

Leaves the Slots Smooth.

Saves Time!

Saves Temper!

Saves Trouble!



Martindale "Imperial" Commutator Stones



Grind Your Own Commutators by Hand
With "IMPERIAL" Stones.

Their use now saving more than \$1,000,000 per year in Maintenance Costs, to say nothing of Elimination of Delays in Production.

MARTINDALE ELECTRIC CO.

1260 West 4th Street, Cleveland, Ohio

Please send me your New No. 8 Catalog, including Carbon Brush and Commutator Trouble Chart.

Name and Title.....

Company

Street Address

City and State.....

MCJ-27.

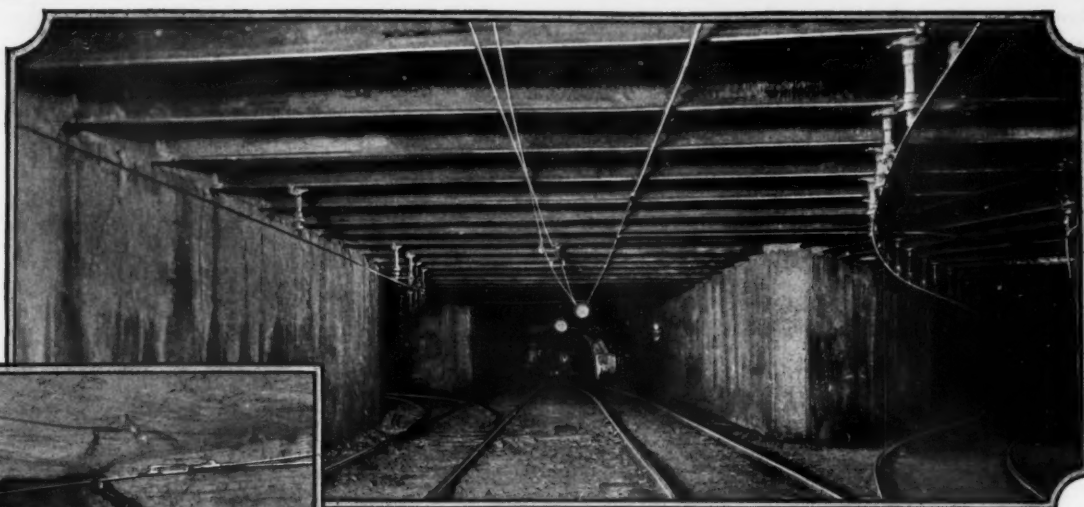
Martindale Equipment will be
Demonstrated at the

**CINCINNATI
CONVENTION**

Booth 202

**MAKE OUR BOOTH YOUR
HEADQUARTERS**

MARTINDALE MOTOR MAINTENANCE EQUIPMENT



Anaconda Trolley Wire in the New Orient Mine of the Chicago, Wilmington & Franklin Coal Co.

The New Orient Mine is equipped with Anaconda Trolley Wire

ANACONDA Trolley Wire is used in the New Orient Mine because their engineers have found that they can depend upon this wire for the continuous service which is necessary to haul the mine's heavy tonnage.

Anaconda Trolley Wire is tough, strong and durable. Its conductivity is unexcelled because it is made of Anaconda Electrolytic Copper—over 99.9% pure.

Six wire mills offer a coast-to-coast service unequalled for promptness and dependability.



WIRE PRODUCTS

Copper Wire
Solid—Stranded
Bare—Weatherproof

Varnished
Cambric Cable
Lead Sheathed
Braid Covered

Paper Lead Cable

Trolley Wire
Copper—Hittens

ANACONDA WIRE PRODUCTS

ANACONDA COPPER MINING COMPANY THE AMERICAN BRASS COMPANY

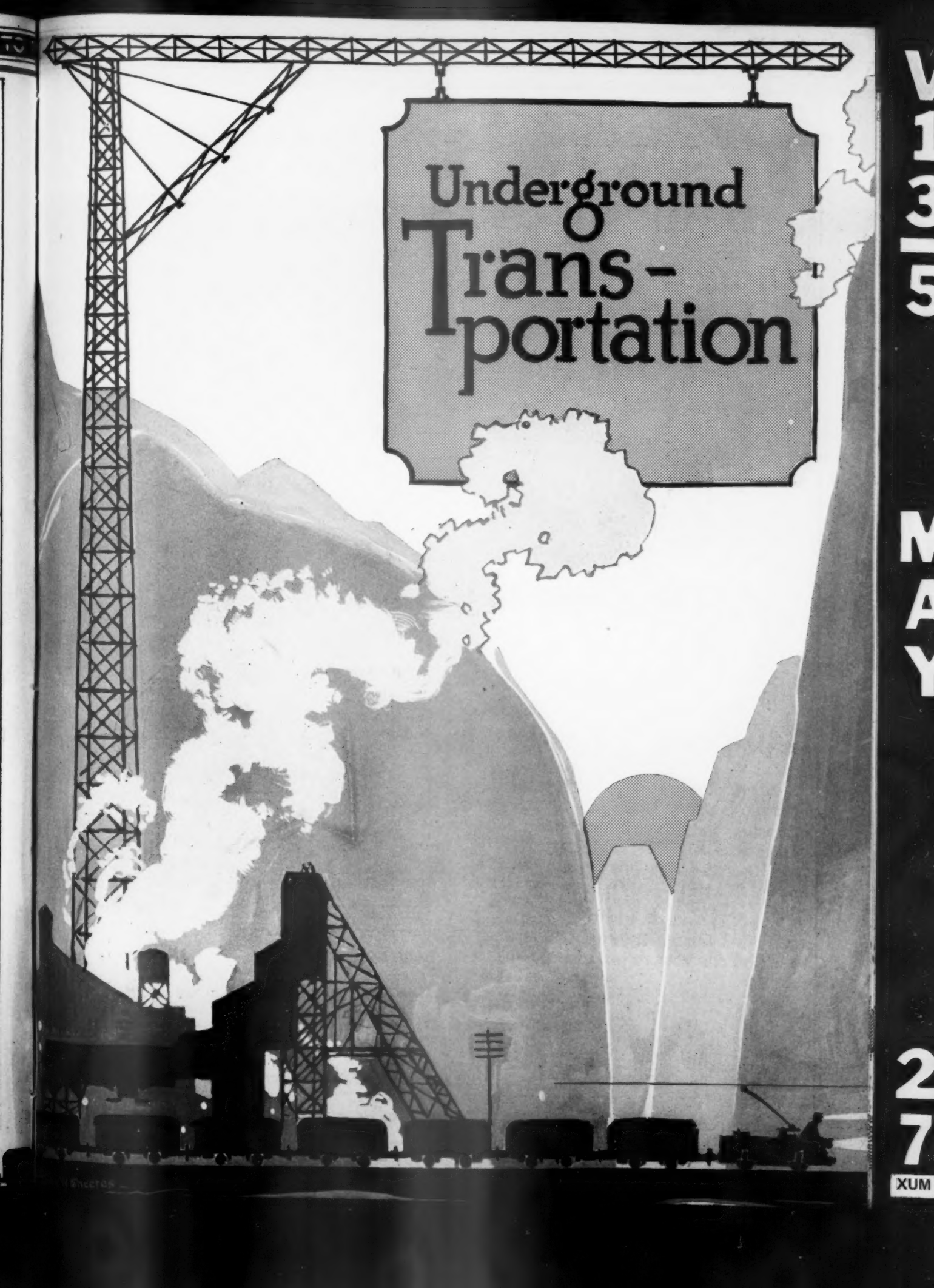
General Sales Offices — Rod, Wire & Cable Products — 25 Broadway, New York

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THE ROAD TO ME

Underground Trans- portation



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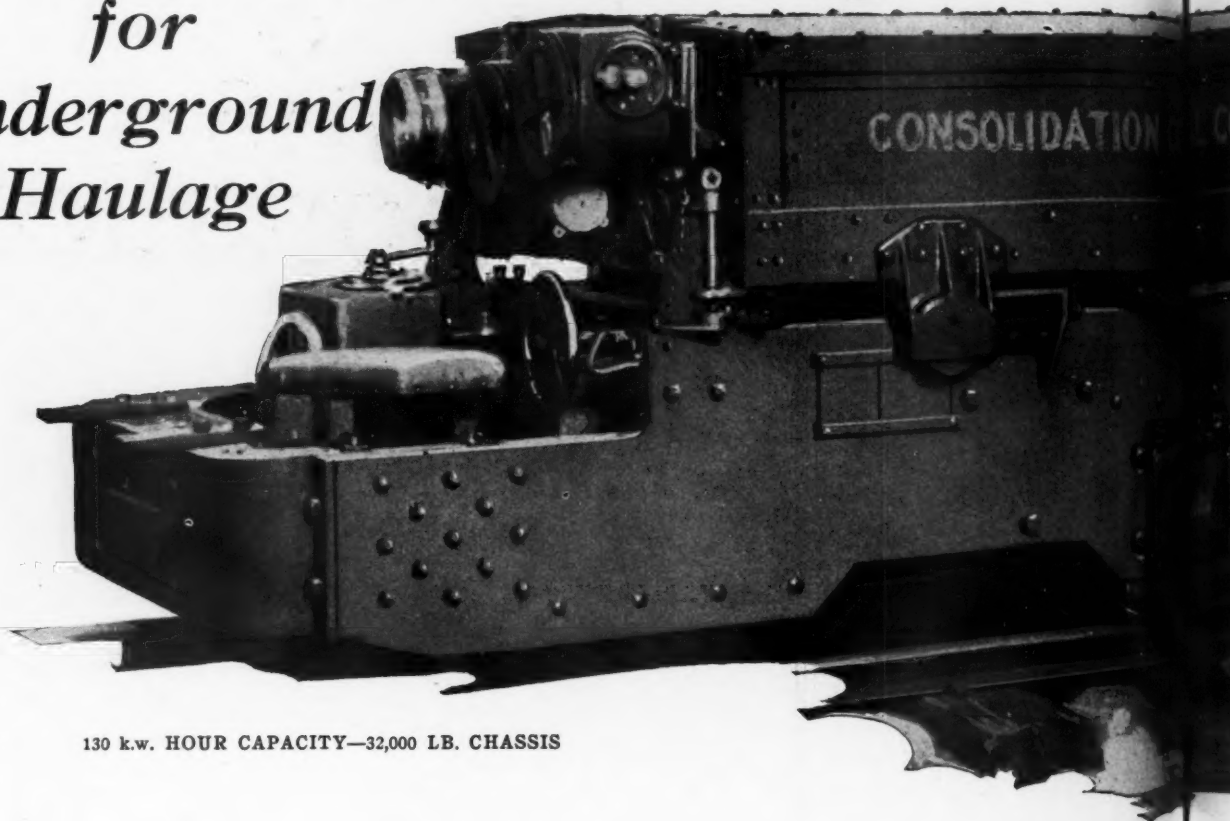
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XUM

World's Largest B

for
Underground
Haulage



130 k.w. HOUR CAPACITY—32,000 LB. CHASSIS

—yet one man can remove its cover

Jeffrey offers this Permissible Storage Battery Locomotive to mine operators who have been using a gang of men to lift off the heavy covers from their battery locomotives at the end of the shift.

The photograph shows the gearing and crank fittings that make it so easy to lift off the covers for inspection.

Jeffrey Permissible Battery Locomotives and Power Trucks for gaseous mines are built in tonnages suitable for gathering or heavy hauling, and insure a uniform voltage under all operating conditions.

Bulletin No. 412-B describes Jeffrey Permissible Storage Battery Locomotives.

The Jeffrey Manufacturing Co.

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Scranton, Pa.

Charleston, W. Va.

Pittsburgh, 600 2d Ave. Salt Lake City, 153 W. 2d South St.

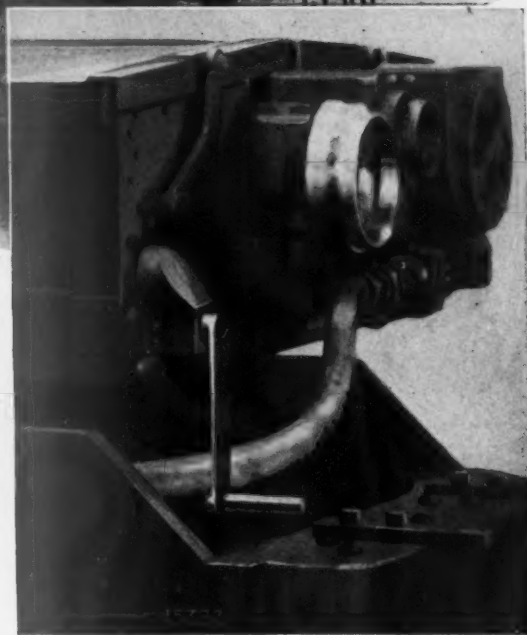
Terre Haute, Ind., 319 Cherry St.

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Manufacturing Company

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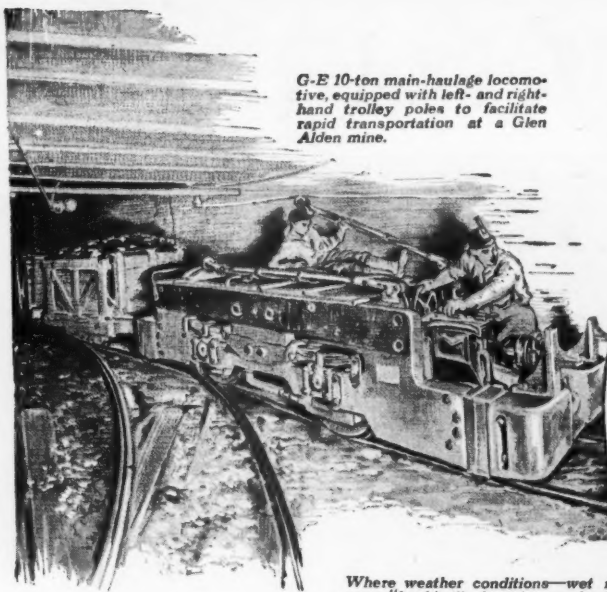
Birmingham, 26 S. 20th St. Winchester, Ky., 122 N. Main St. Scranton, Pa., 122 Adams Ave.

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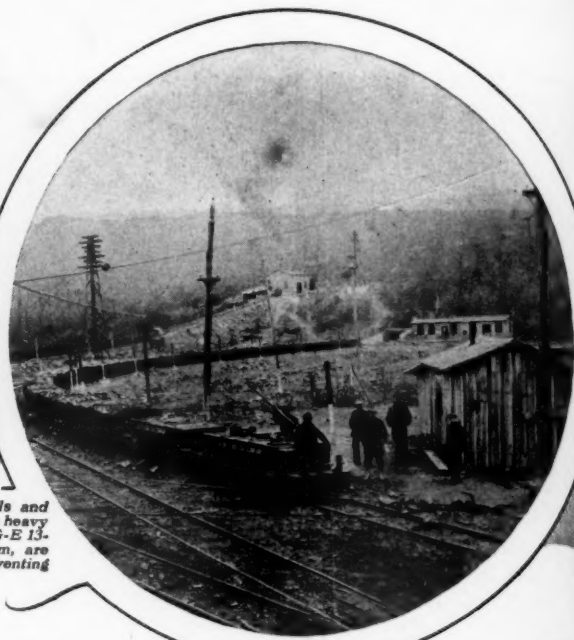
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XU



G-E 10-ton main-haulage locomotive, equipped with left- and right-hand trolley poles to facilitate rapid transportation at a Glen Alden mine.



Where weather conditions—wet rails and snow "bucking"—have imposed extra heavy duty upon haulage equipment, these G-E 13-ton locomotives, operated in tandem, are speeding trip movements and preventing excessive up-keep costs.

Haulagerways—

The Arteries of Production

General Electric meets the new pace set by present-day mechanized mining practices with a complete line of up-to-the minute trolley and storage battery locomotives. The leaf springs and equalizer bars on G-E locomotives distribute the weight on all the wheels and insure quicker starts and faster service. Each pair of wheels follows track irregularity and each motor does its share of the work, thus eliminating costly maintenance. Progressive series-parallel control with electric braking provides for rapid and economical gathering of trips at the face. Haulage locomotives with contactor control can be relied upon for exacting service.



General Electric locomotives are designed by G-E, built by G-E, tested by G-E, and possess the absolute reliability typical of all G-E products. If renewal parts are desired, they, too, should be secured from G-E.

G-E locomotives were among the earliest electric locomotives used in coal mines. Through succeeding years they have given complete satisfaction wherever installed. Constantly they have been refined and perfected. Now they are recognized as the electric locomotive standard throughout the mining regions.

GENERAL

GENERAL ELECTRIC COMPANY, SCHENECTADY, N. Y.

THE ROAD TO MECHANIZATION

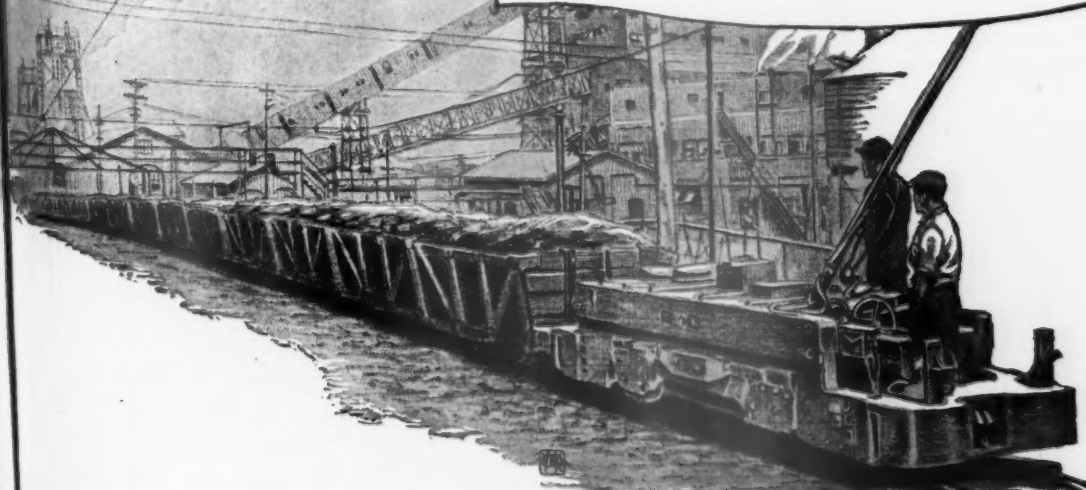


New type G-E haulage locomotive with contactor control at Suffolk Anthracite Collieries, Avoca, Pa.

HAULING is only one phase of coal mine operations served by General Electric. Thorough electrification and G-E equipment combine to obtain high unit production and low unit costs also in

Hoisting—Pumping—Cutting and Shearing—Loading and Conveying—Ventilation—Rockdusting—Air Compressing—Preparation—Stripping—Power Generation—Power Distribution and Conversion—Etc.

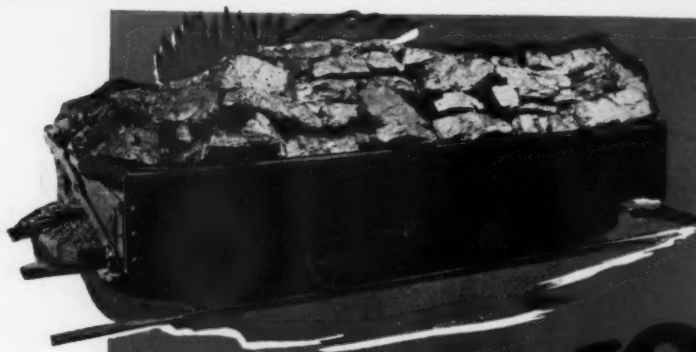
Whatever the need, G-E meets it so dependably and economically that each General Electric installation recommends another.



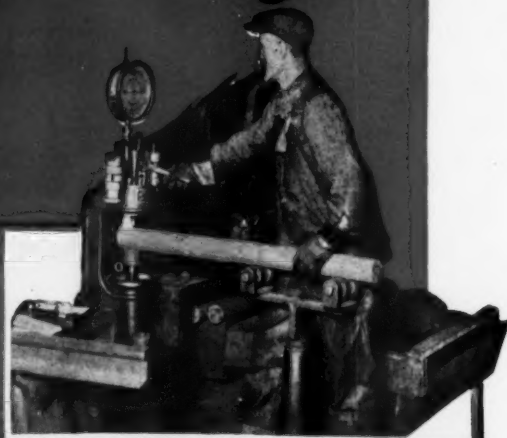
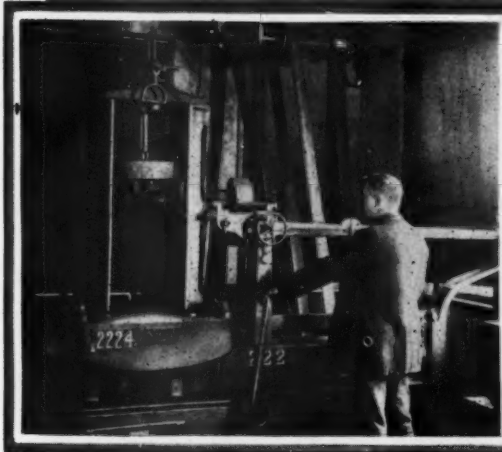
360-9

ELECTRIC

SALES OFFICES IN PRINCIPAL CITIES



To lower your



cost per ton—

—your cars must pass these pre-service tests

Chemically OK'd

When you see heavily loaded cars—a long string of them—pounding over the tracks, does it occur to you that their service capacity can be largely determined in advance by chemical as well as mechanical tests? Chemical tests prove conclusively whether various car parts are going to withstand shocks, strains and wear.

The pig iron and other ingredients used for making "Car Foundry" Wheels are tested. A. F. Iron for couplings and drawbars is similarly tested by chemistry. The steel from which "Car Foundry" Steel Axles are made is tested. Steel sides, ends and bottoms are also OK'd chemically. Even the coal used in the "Car Foundry" furnaces is tested.

Mechanically OK'd

Mechanical tests as well as inspections by experts follow through after each step in the manufacture of "Car Foundry" Cars.

The A. F. Iron for drawbars is tested for pulling capacity. The special axle steel is tested for carrying capacity. The metal of the wheels is inspected before and after the wheels are formed. And many inspections of workmanship and checks on accuracy required are made while the various parts are being machined.

Better Made Cars Not Made

In fact nothing is left undone which can be done by scientific procedure and up-to-date facilities to make certain that "Car Foundry" Cars and car parts are going to withstand the toughest service to which cars are subjected in the mine.

Cars and Co-ordination

Only with Cars made and tested the "Car Foundry" way can you be assured of maximum car service, minimum car maintenance expense, continuous coal transportation, the highest production and lowest possible cost of operation of your entire system.

Vital to Continuous Operation of ALL Your Equipment

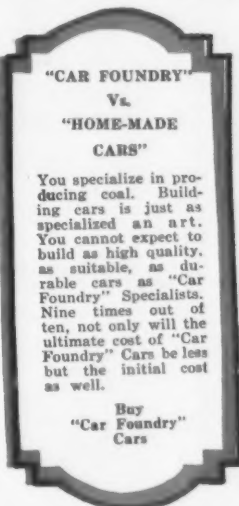
Without maximum car service, your hoists, undercutters, mechanical loaders, drills, and coal preparation equipment cannot work to full capacity.

Pay for Themselves

"Car Foundry" Cars pay for themselves by making possible more continuous operation of all your equipment through a more constant flow of coal, by lower car maintenance cost—by lower costs per ton from face to railroad cars.

Write the nearest branch

Write for particulars on how "Car Foundry" Cars are lowering the cost per ton of leading mines throughout the coal regions.



American Car and Foundry Company

New York St. Louis Chicago Pittsburgh
Berwick, Pa. Bloomsburg, Pa. Huntington, W. Va. Terre Haute, Ind.

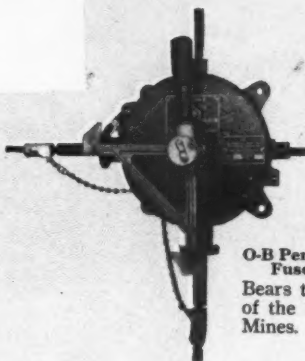
CAR FOUNDRY

ELECTRIC RIVET HEATERS
BARS, IRON and STEEL
CAR IRONS

BOLTS, NUTS, RIVETS
IRON BODY GATE VALVES
CAR TRUCKS

CHILLED IRON WHEELS
PINS AND LINKS
FLANGED PIPE





**O-B Permissible Gas-Proof
Fused Junction Box**
Bears the approval plate
of the U. S. Bureau of
Mines.



**A Simplified Fused Trolley
Tap**
Uses Trico powder-packed
fuses. Maximum ratings,
200 amp., 110v-250v and
100 amp., 600v.

The following list of newly developed
devices will be shown for the first
time at Cincinnati:

1200-amp. Safety Switch
600-amp. Safety Switch
Motor Starter
Feist Trolley Wheel
Trolley Shoe
1200-amp. Circuit Breaker
Pump Circuit Breaker
Double Insulated I-Beam Hanger
MCM Trolley Splicer
MBC Trolley Frog



Old Bill Wise sez—

"All hands on deck for the
Cincinnati Convention, May
16-20".



**Combination Feeder Sling and
Trolley Clamp.** Page 504, Cat.
20.

**Bulldog Clamp Feeder
Sling.** No. 14845, page
506, Cat. 20.

O-B Motor Cable Connector
Made in four sizes. Page 513
Cat. 20.

**Type C Mine
Feeder Wire
Insulators.**
Page 502, Cat.
20.

AW-12 Arc-weld Bond, page 670, Cat. 20.

Guard Board Support.
No. 14847, page 514,
Cat. 20.

Bulldog Angle Iron Clamp.
No. 14632, page 525, Cat. 20.

O-B Mine Rail Clamp. No. 14627,
page 513, Cat. 20.

Cam Grip Trolley Wire Splicer.
No. 14848, page 548, Cat. 20.

Dead End Assembly. Page 497, Cat. 20.



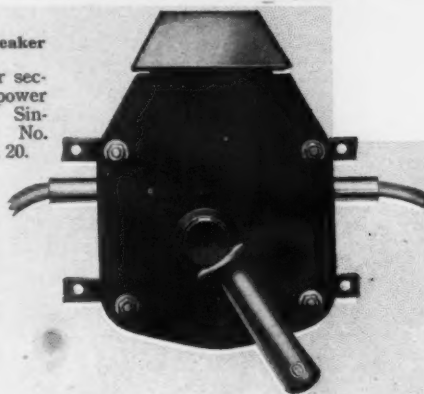
The big blue covered
catalog No. 20 has full
information on O-B
Mine Necessities. Have
you your copy?





Type AW-15 Bond
New O-B copper alloy arc-weld concealed bond applied to the rail base out of the way of possible dragging equipment. Cat. No. 15295.

Automatic Circuit Breaker Switch
Protective device for sectionalizing mine power and trolley circuits. Single pole, 550-volt. No. 14983, page 506 Cat. 20.



These New O-B Devices Offer New Economies



Don't "call it a day" until you have examined the O-B brand new devices shown for the first time—O-B Exhibit spaces 40-45.

THESE new O-B Mine Devices pictured on these pages have been added to the O-B line since last year's Mining Congress convention. Practically speaking, they have been conceived and designed by mining men. The needs of mining men suggested them. The ideas of mining men are incorporated in their design. Mining men have tested them on the job and find they fill the bill. Naturally, then, mining men are accepting them because they meet requirements.

Men who are wide awake in stopping production leaks have realized that these devices will safeguard their revenue.

What these O-B products have already done for others, they will do for you. Why not put them to work? They will be shown at the mining show. Look them over, see how well they are made to stand service. Ask O-B Engineers for full information on how they will work for you.

Ohio Brass Company, Mansfield, Ohio
Dominion Insulator & Mfg. Co., Limited
Niagara Falls, Canada
375M

Ohio Brass Co.

SALES OFFICES: NEW YORK CHICAGO



PHILADELPHIA PITTSBURGH CLEVELAND
SAN FRANCISCO LOS ANGELES

PORCELAIN
INSULATORS
LINE MATERIALS
RAIL BONDS
CAR EQUIPMENT
MINING
MATERIALS
VALVES



SAFETY AND PERFORMANCE

The Atlas Storage Battery Locomotive has been approved by the United States Bureau of Mines for use in gaseous mines. It is safe so far as human foresight can make it safe.

No sacrifice of the high performance qualities for which the Atlas Locomotive is noted was necessary to make it safe. These performance qualities actually were improved and the "ATLAS DOES HAUL MORE COAL" with a smaller expenditure of battery power than any other locomotive.

It is *never* necessary to change batteries during the working shift in gathering service when using Atlas Permissible Locomotives.

Pond Creek Pocahontas Company at Bartley, W. Va., will tell you things about this machine which we are too modest to enumerate.

The Atlas Car and Manufacturing Co.

Engineers

Manufacturers

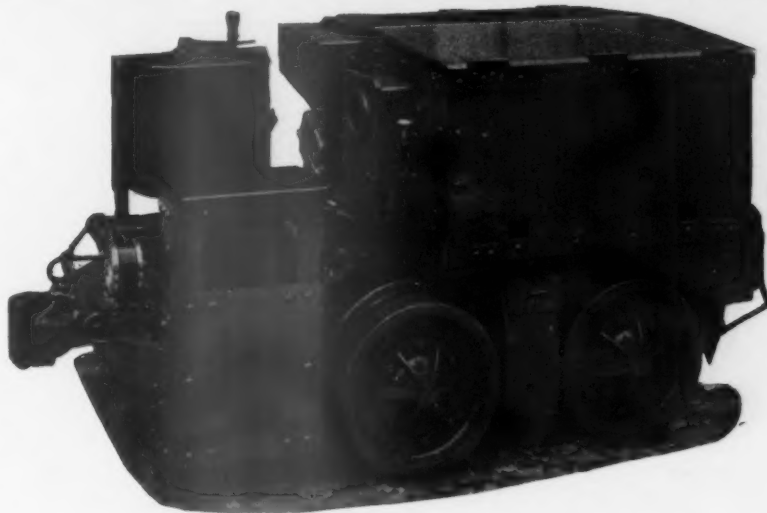
CLEVELAND, OHIO

ELECTRIC AND STORAGE BATTERY CARS FOR EVERY HAULAGE REQUIREMENT.

SCALE CARS—TRANSFER CARS—CONCENTRATE CARS

COKE PLANT MACHINERY

*Storage Battery
Locomotives
for
Tramming Service
in Metal Mines*



1 1/2 TON—TYPE H—TRAMMING LOCOMOTIVE

Four Wheel Drive Locomotive small enough to go on Mine Cage. Has removable battery. Made for 18-20 and 24-inch Track Gauge.

Cars and Locomotives for every Haulage Requirement.



Special Type "A"
2 1/2 Ton
Storage
Battery
Locomotive

24-inch TRACK GAUGE

This locomotive is equipped with Cable Reel and Remote Control by push-button which permits operator stationed at loading chute to spot entire train of cars and load each respective car, controlling his train from this single station, paying out control cable through reel.

The Atlas Car and Manufacturing Co.
Engineers *Manufacturers*

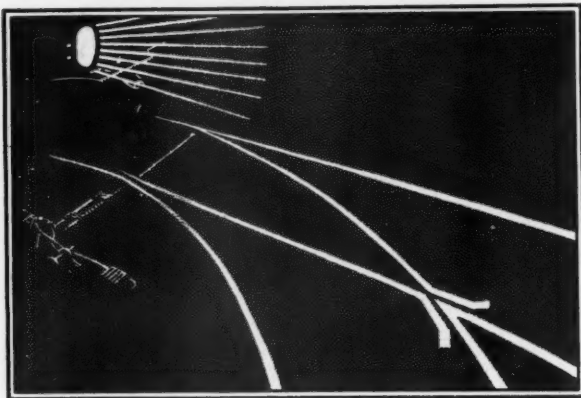
CLEVELAND, OHIO

ELECTRIC AND STORAGE BATTERY CARS FOR EVERY HAULAGE REQUIREMENT.

SCALE CARS—TRANSFER CARS—CONCENTRATE CARS

COKE PLANT MACHINERY





The Increasing Importance of

What proper track layout means to a mine

SAFETY OF HAULAGE.

This paramount factor is directly dependent upon proper planning and the use of good materials.

SPEED OF HANDLING.

This is the main point back of all improvements in mine transportation.

CAR DISTRIBUTION.

Cars are supplied more readily where and when needed.

LESS EQUIPMENT. Better car distribution allows a

given tonnage to be handled with less cars and sometimes fewer locomotives.

DERAILMENTS ELIMINATED.

This and other costly delays are reduced to a minimum by proper layout and equipment.

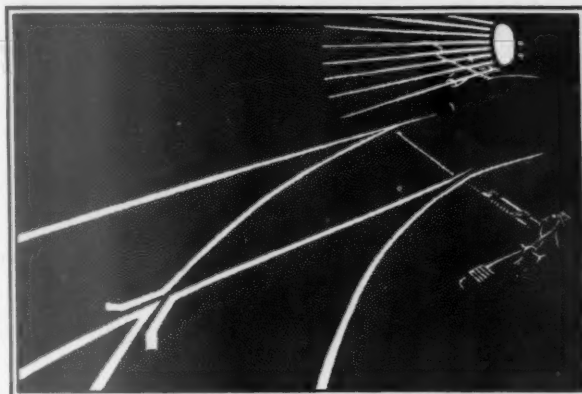
REPLACEMENTS FACILITATED.

Standardization of equipment according to a fixed plan facilitates replacements, reduces the track man's labor and enables him to shift track readily.

*When in Cincinnati we cordially invite you to visit our plant
Phone us while at the Convention, or write for Catalog No. 3*

CENTRAL

MINE TRACK EQUIPMENT



Importance of Mine Track

MANY experts consider track the most important item of all mine machinery. The increasing speed of production under the growing mechanization demands an efficiency of track layout and equipment unthought of a few years ago. It must be laid out so that it will allow the same locomotives to haul heavier trains. It must carry modern cars with their smaller wheels without danger of derailments. In fact, the success of loading machines is largely predicated upon track systems that will feed cars to and from them rapidly.

A track system that is laid out scientifically, constructed of the best material and maintained properly costs much less than poor track, saves power and increases production. CENTRAL engineers have made it their business to bring these results to mines where they have been privileged to plan or cooperate on the mine layout or trade improvements.

The CENTRAL FROG & SWITCH COMPANY

CINCINNATI, OHIO

CENTRAL

MINE TRACK EQUIPMENT

Mancha's *Wireless Mining* Method

100 %

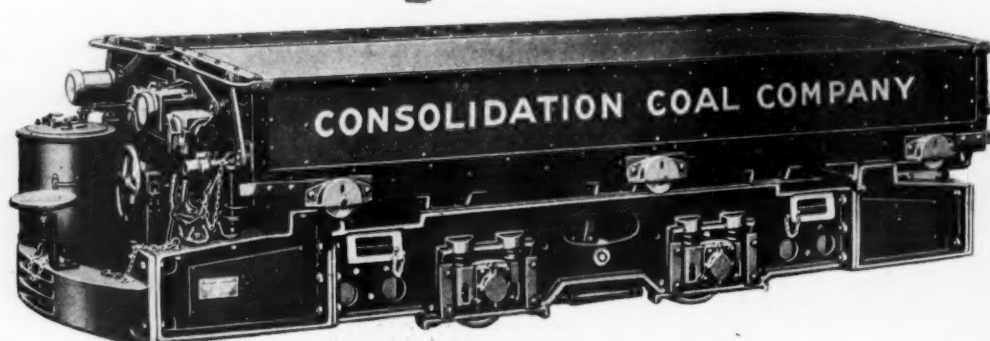
After Mancha drove out the mine mule with the, now, widely used and generally recognized Mancha Storage Battery Locomotive, Mancha engineers set about to solve the problem of taking dangerous wires out of mines and of delivering ample power SAFELY at constant voltage to cutting machines, doing all of this at lower cost. A wild dream, yes, BUT the wild dream is realized in Manchas Wireless Mining Method.

Mancha Permissible Locomotives were already developed and at work doing the haulage safely and economically.

We next pioneered, developed and perfected the Mancha Power Truck which has solved the problem of furnishing ample power, at constant voltage.

Manchas Patented Transfer Racks were a logical and necessary develop-

And / With



MANCHA STORAGE BATTERY LOCOMOTIVE

THE ROAD TO MECHANIZATION

Mancha's Wireless Mining Method

Safety

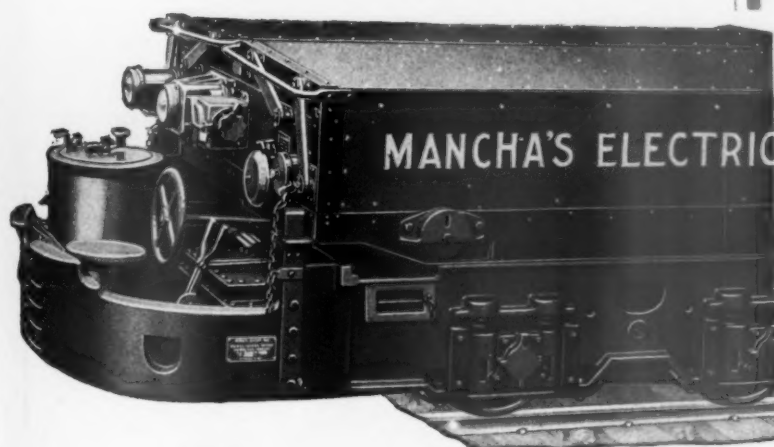
ment in order to keep down the initial or capital expenditure and to insure an ever constant supply of ample power to the locomotives and Power Trucks, permitting the changing of the heaviest batteries in less than three minutes.

The Transfer Racked Hinged Lids are primarily a Mancha development being covered by patents owned and controlled by the Mancha company.

This completed the equipment necessary for Mancha's Wireless Mining Method.

The experience which Mancha engineers have found in wireless mining and the equipment which they have developed qualifies us to render our expert engineering service to mine operators the world over. Tell us your conditions.

Lower / Cost

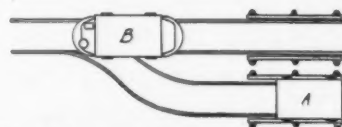


Eliminates all permanent wiring—a constant danger.

Power for cutting, shearing, drilling, loading, pumping, is supplied by Mancha's Power Truck.

Hauling is done with Mancha Electric Mule.

Mancha's Patent Transfer Rack is essential in large scale wireless mining. It provides the only safe and economical method of changing batteries.



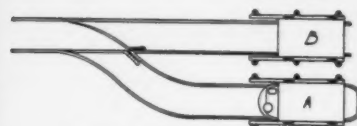
Charged battery A in one rack. Locomotive with discharged battery B entering other rack



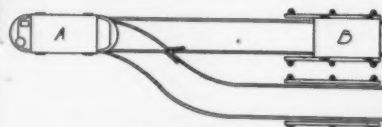
Locomotive depositing discharged battery B on rack



Chassis withdrawn from discharged battery B and ready to enter rack to receive charged battery A



Chassis in rack under charged battery A ready to start out



Locomotive out of rack with charged battery A
Discharged battery B remains in rack for charging

LOCOMOTIVE CO., 1909 S. Kingshighway

ST. LOUIS, MO.

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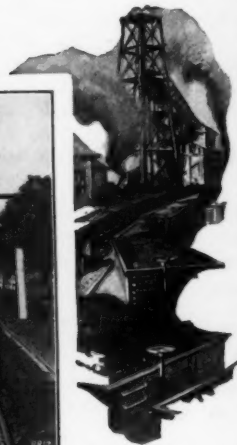
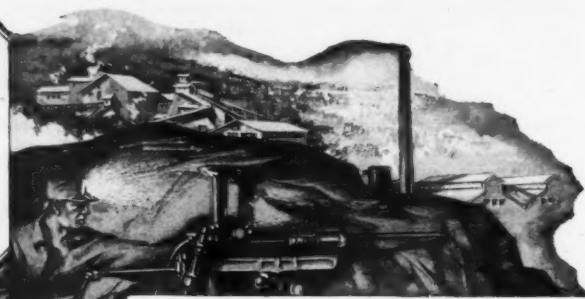
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ONE OF THE
25
MANUFACTURERS
IN THE
COAL INDUSTRY
USING

SKF



On All Types of Mining Equipment **SKF** Bearings Will Cut Operating Costs

Bring Your Bearing
Problems to

SKF

at Spaces 210-211

American
Mining Congress

Cincinnati, O., May 16-20

and our engineers will gladly
cooperate in helping you select
"the right bearing for the
right place."

FACTS—the practical, everyday use of many types of mining equipment has shown conclusively the inherent reliability of **SKF** anti-friction bearings and their ability to stand up under the hardest service. In one large mine these bearings have increased the life of locomotive motors over 50 percent before overhauling is necessary. And not only on 23 locomotives ranging from 6 to 15 tons but also on a wide variety of other equipment, **SKF** Bearings are successfully used:—centrifugal pumps, trolley bases, cutting machines, etc.

"We feel that where their application has been carefully studied and the true economic significance placed on their performance, in relation to that of the entire machine or process, **SKF** Bearings have made a creditable showing in our mining equipment," states the General Master Mechanic and Chief Electrical Engineer of this mine where **SKF** Bearings have been in service over 13 years.

Whatever your mining equipment may be, a study of Certified Survey No. 1792 on this installation will show you the advantages and savings which **SKF** Bearings can bring to your mining equipment.

SKF INDUSTRIES, INCORPORATED, 40 E. 34th St., N. Y. C.

1792

More than 100 Factory Offices Throughout the World



**Ball
Bearings**

**Roller
Bearings**

THE ROAD TO MECHANIZATION



Mining Profit is Linked with Low Cost of Production

MAKING production records is nothing new with Enterprise Cars. They are low in height with great carrying capacity and small maintenance cost.

Low cost of repairs—ease in starting loads—smoothness in running—less friction and consequently less grease, effect additional savings.

Here's a car that meets the problem of the low seam, increases the efficiency of the miner and adds to output with a resultant decrease in the cost-per-ton.

Extra capacity cuts initial cost. Every purchase of mine cars is a purchase of production. Enterprise Cars reduce the cost-per-ton between the loading and the tipple.

"Not a nickel for repairs." Half Mountain Coal Co., Huntington, W. Va.

"Four hundred and ten sets of Enterprise Trucks purchased over a period of seven years and total repair bills amounted to only \$11.95." Elkhorn Coal Co., Kenosha.

"Our mine is equipped with Enterprise Cars and believe me, they are A No. 1 cars." H. C. Roskey, General Superintendent, Furnace Mining Co.

These are some of the reasons why we can give a five-year absolute guarantee contract with every purchase of car wheels.

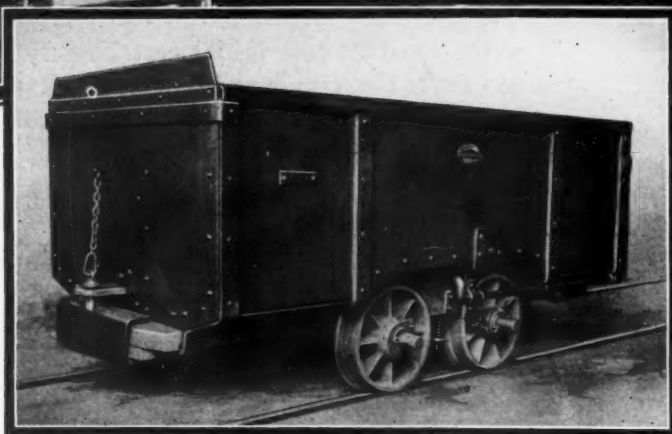
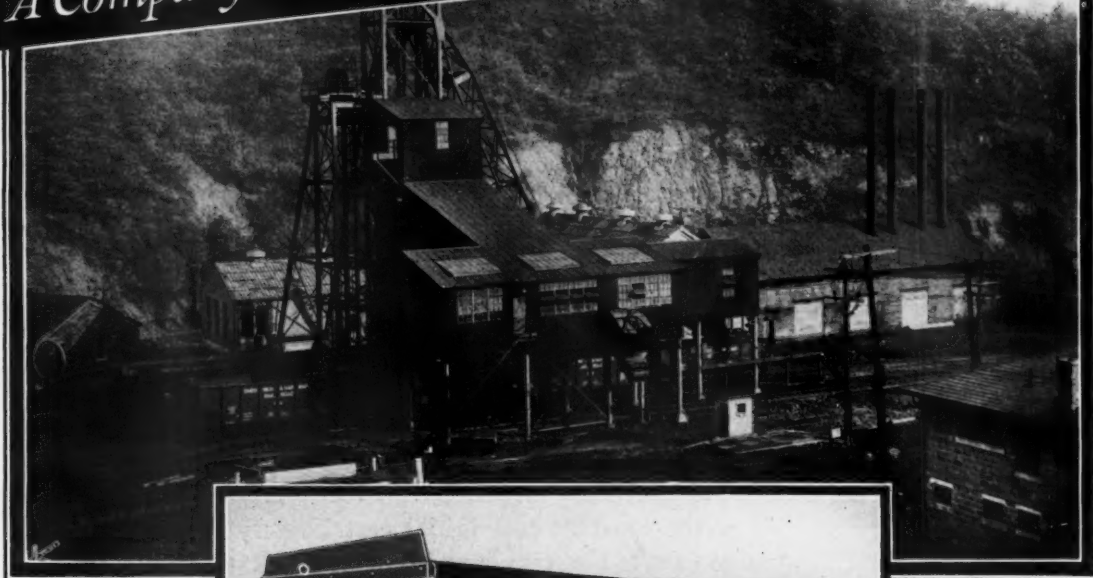
We have just issued a most comprehensive booklet on mine haulage containing full details and proof of foregoing statements. The edition is limited—write for one or secure it from our booth at the Cincinnati Exposition. Ask for "Lower Haulage Costs, Higher Net Profits." It is free to any mine executive or superintendent.

Enterprise Wheel and Car Corp.

Bristol, Va.-Tenn. Huntington, W. Va.



A MAN IS KNOWN BY THE COMPANY HE KEEPS
A Company is known by the Customers it keeps



At the Harwick Coal and Coke Company mine (the tippie is pictured above) at Harwick, Pennsylvania, four hundred Hockensmith cars of the type illustrated are in service. The car capacity is three and a half tons.

Roller bearings are used throughout. The special alloy heat-treated axles are extended for use in a rotary dump. This dump is located at the shaft bottom, and the coal is hoisted in ten-ton skips.

HOCKENSMITH WHEEL & MINE CAR CO.

PENN, PA.

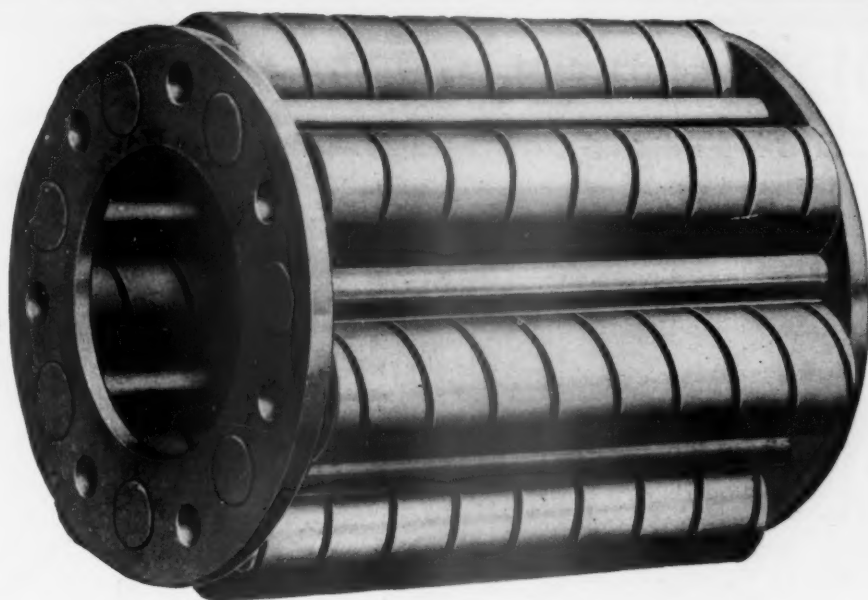
(Pittsburgh District)

Long Distant Phone:—Jeannette 700.

Huntington, W. Va.—Huntington Supply & Equipment Company

Knoxville, Tenn.—Webster & Company

Clarksburg, W. Va.—Mr. Norman Strugnell



Stop Wasting Grease

Hyatt Roller Bearings cut your lubrication bills 80%. A shot of grease every three or four months assures 100% service from your Hyattized cars. For low cost, big tonnage mining specify that your cars be equipped with Hyatt Roller Bearings.

HYATT ROLLER BEARING COMPANY

Newark Huntington Pittsburgh Chicago Philadelphia
Detroit Oakland Worcester Cleveland

HYATT
ROLLER BEARINGS

PRODUCT OF GENERAL MOTORS

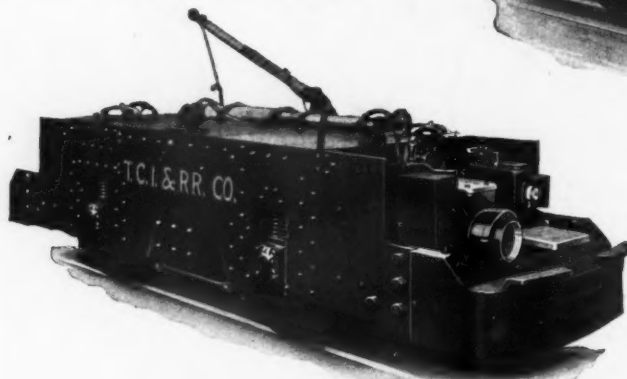


MODERN GOODMAN

Gathering and Haulage Locomotives



15 tons, with two 120-hp. Motors. Built in sizes 4 to 30 tons



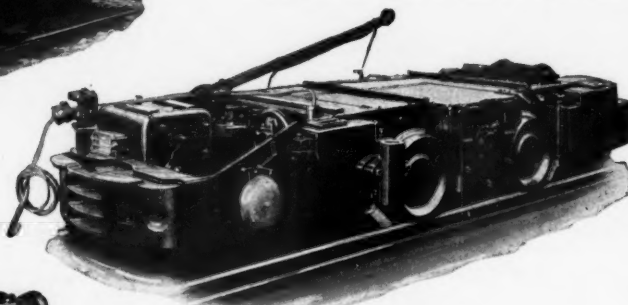
An 8-ton 2-Motor Double End Control Haulage Type.



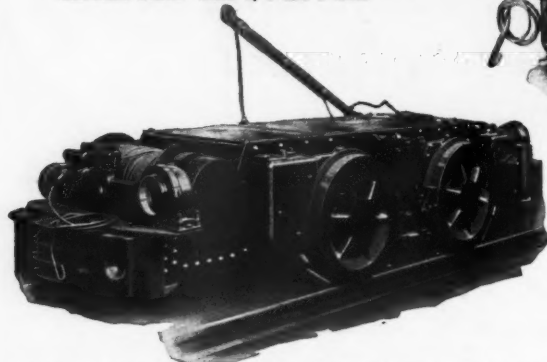
A 5-ton Single Motor Gathering Locomotive, Short Wheelbase 27 in. Built in Sizes 4, 5 and 6 tons.



An 8-ton 2-Motor (100 hp.) Gatherer with Enclosed Electrical Parts. Sizes 4, 6 and 8 tons.



A Low 5-ton Single-Motor Gathering Locomotive. Deck Height 24 in.—4 ton Size, Deck Height 21 in.



A 6-ton 2-Motor Slow Speed Gatherer. Built in Sizes 4, 6 and 8 tons.

Builders of
Mine Locomotives
for 35 Years

GOODMAN

Locomotives - Loaders - Coal Cutters

MANUFACTURING COMPANY
HALSTED ST. at 48TH
CHICAGO --- ILL.

PITTSBURGH - CHARLESTON, W. VA. - HUNTINGTON, W. VA. - CINCINNATI - BIRMINGHAM - ST. LOUIS - DENVER - PRICE, UTAH (49)



Hulburt Products:

Mine Car Grease
Mining Machine
and Locomotive
Lubricant
Wool Yarn Elastic
Grease
Cup Greases
Cable Dressing
Mechanical Loader
Grease

HULBURT OIL & GREASE CO.
General Offices & Works
Philadelphia, Pa. Distributing Points Throughout
Coal Fields

HULBURT

SPECIALISTS IN COAL MINE LUBRICATION



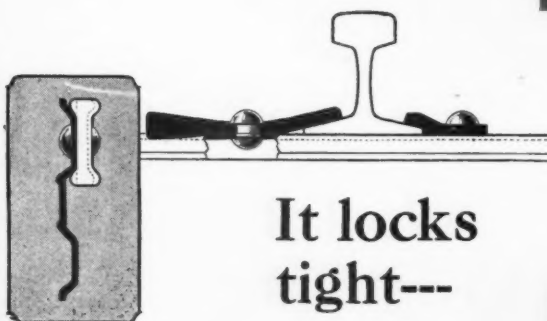
West Va. Mine Ties



*Service in delivery
Service in use---*

Service in delivery that is made possible by immense stocks of standard ties and by large manufacturing capacity.

Service in use that is assured by a tie that is easy to handle and install and so designed as to positively hold the rail in place and to correct gauge. The clip action is a patented, exclusive feature which will justify your giving preference to West Virginia Steel Ties. These ties make a safe track that is cheaper in ultimate cost and easier on cars and haulage motors.




**It locks
tight---**



VISIT OUR BOOTH NO. 41 AT THE CINCINNATI EXPOSITION

The West Virginia Rail Company
Huntington, W. Va.

Rails; Mine Ties; Plate Frogs; Solid Steel Frogs; Switch
Stands; Switches; Special Track Work; Portable Track;
Splices; Angle Bars and Spikes; Reinforcing Bars.



Ventilation Equipment

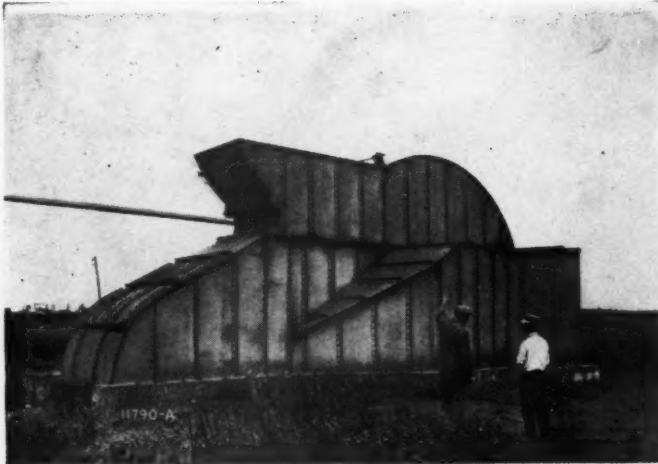
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XUM

From the Main Fan to Small Boost Jeffrey Fan Ser



12-ft. Double Inlet Primarily Blowing Reversible Fan. Normal capacity, 300,000 cu. ft. at 3-inch gauge 140 R.P.M. This fan can be assembled complete in three days.

KEEPING the mine in a healthful and safe condition is the primary object of ventilation. Jeffrey Fans go one step further by materially cutting power bills.

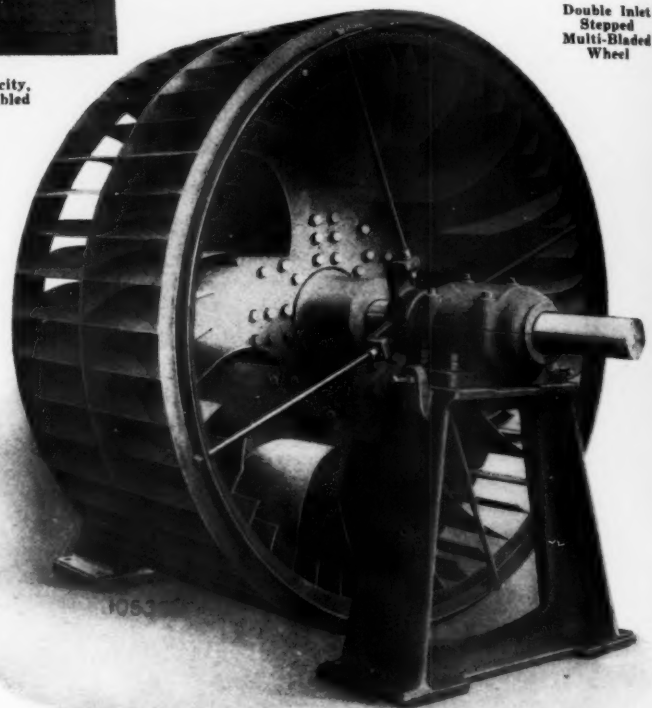
Several features of design that increase the mechanical efficiency of Jeffrey Fans are described below, but perhaps the greatest proof of Jeffrey Fan efficiency is found in repeat orders. One mining company has installed 70 Jeffrey Fans. Several others have only slightly less than this number.

Stepped Multi-Bladed Mine Fan—

The stepped series of blades and ample sizes permit handling air at low velocities, cutting power bills 10% to 30%. Hammered steel shafts

and dust proof dynamo type bearings make this fan a safe operating unit that requires very little attention. Complete steel housing saves time, trouble, and expense to install. Sizes from 2 ft. to 18 ft. diameters with capacities of 10,000 C.F.M. to 600,000 C.F.M. Catalog No. 280-F.

Straitflo Fan — Used for ventilating small mines, developing larger ones, also for boosting purposes. Especially economical and convenient for Drift, Shaft and Slope Mines. Blades are designed to prevent the back flow of air common to ordinary disc



Double Inlet
Stepped
Multi-Bladed
Wheel

The Jeffrey Manuf ac

958-99 North Fourth Stre

New York

Philadelphia

Scranton, Pa.

Pittsburgh

Chicago Charles

SALES AND SER VICE S

Pittsburgh, 600 2d Ave.

Salt Lake City, 153 W. 2d South St.

Terre Haute, Ind., 319 Cherry St. Birming

THE ROAD TO MECHANIZATION

er Fans for Auxiliary Ventilation vice Is Complete

fans. Equipped with heavy self-aligning Roller Bearings. Carried in stock. Bulletin No. 348-C.

Universal Blowers — For use with flexible tubing in ventilating dead ends, entry driving, etc. Ball Bearing Motor (A.C. or D.C.) and completely welded steel housing are bolted to the same heavy cast iron base, making a self-contained equipment. Wheel



Both bearings of this Straittflo Fan are mounted on heavy cast iron stands independently of the fan casing, eliminating all vibration. Can be examined without going into air course.



A Double Inlet Exhaust Fan installed at a shaft mine. Fitted with steel side drifts, steel hood extending over air shaft and a steel motor house.

man can load and unload sizes up to 16 inches. Larger sizes can be handled by two men. Carried in stock. Bulletin No. 408-A.

Safeload Fans with Backward Curved Blades for forced draft. Also used as auxiliary ventilation in metal and coal mines. Arranged for direct connection to motors. Catalog No. 440-A.



Universal Blower

is mounted directly on motor shaft — eliminates coupling and makes a compact unit. Sizes from 8 inch to 28 inch diameters with capacities of 500 C.F.M. to 10,000 C.F.M. One

Manufacturing Company

Street, Columbus, Ohio

Charleston, W. Va.

Salt Lake City

Denver

Montreal, Canada

Birmingham

VICE STATIONS

Birmingham, 26 S. 20th St.

Winchester, Ky., 122 N. Main St.

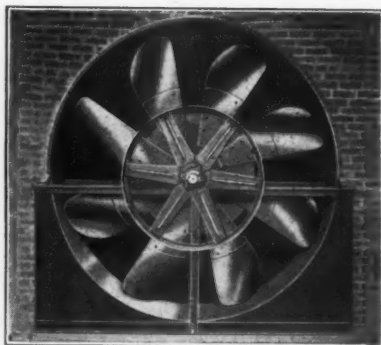
Scranton, 122 Adams Ave.



ROBINSON FANS



FOR EVERY PURPOSE



**ROBINSON CONIFLO MINE
TYPE DISC FAN**

Notice the heavy construction of the fan. Wheel is mounted between two Ball or Roller Bearing Pillow Blocks. Standard Equipment. Capable of high speeds and of good efficiency. Carried in stock at Factory at all times.



**ROBINSON TURBINE TYPE
WHEEL**

No tie rods are necessary to support wheel. These wheels are made in sizes from 12-inch diameter to 25 ft. diameter. They are made special to meet the conditions required of them.



**ROBINSON AUXILIARY CEN-
TRIFUGAL FANS**

Used for primary fans on small mines or auxiliary fans inside larger mines. Notice the unit construction, making these fans easily portable. Made in any size required.

**ROBINSON
PORTABLE
KILN
COOLERS**

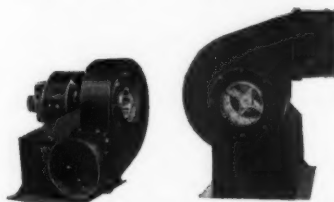


**ROBINSON
PORTABLE
KILN
ACCELERATORS**

ROBINSON REVERSIBLE MINE FAN

This can be purchased with or without the steel air drift side wall, roof plate and hood over shaft. Hood equipped with explosion doors. Full steel housing, $\frac{3}{4}$ or $\frac{1}{2}$ steel housing. This can be arranged for extended drives, with drive on either side or two drives on one side. All Robinson Reversible Mine Fans are constructed so that they are efficient when either blowing or exhausting. They are scientifically designed and constructed to give you the most efficient installation possible. All doors are packed to prevent leakage of air.

All our centrifugal fans are built to order the same as the tailor makes your suit to order. This is the reason they fit your mine.



ROBINSON TUBING BLOWER

For use in the mine with flexible tubing or sewer pipe to conduct the air. Structural steel motor base with casing arranged for eight different angles of discharge. Inlets protected with safety guards. Outlet constructed of Cast Aluminum; fan wheel constructed of Cast Aluminum up to and including the No. 3 size. Write for special bulletin.

We manufacture the
**FAMOUS
ROBINSON
MAN COOLING
FAN
PRESSURE
BLOWERS
FORCED and
INDUCED
DRAFT FANS**

ROBINSON
ZELIENOPLE Ventilating Co. PENNSYLVANIA

TO

Drainage Equipment



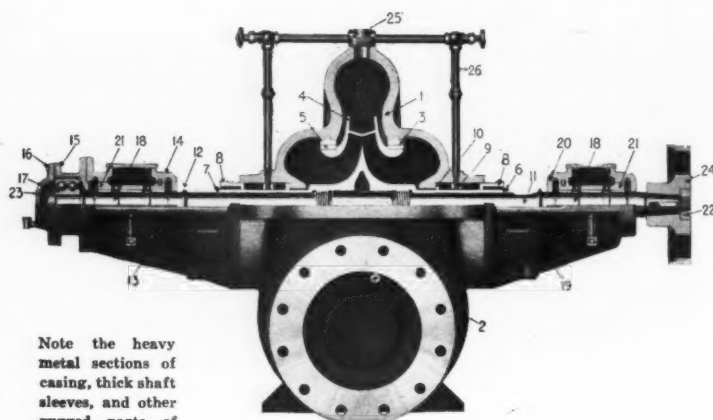
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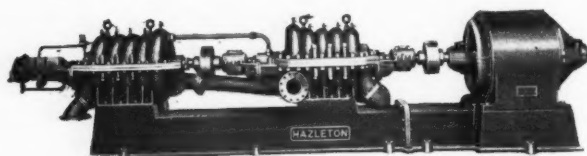
CENTRIFUGAL PUMPS



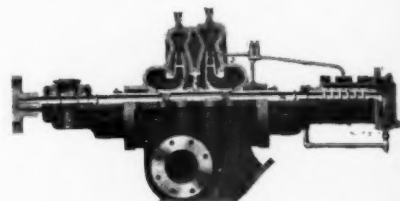
Note the heavy metal sections of casing, thick shaft sleeves, and other rugged parts of this pump. Made in 8-in. to 12-in. sizes, capacities from 200 to 6,000 G.P.M. Heads up to 150 ft.

Designed For Mine Service

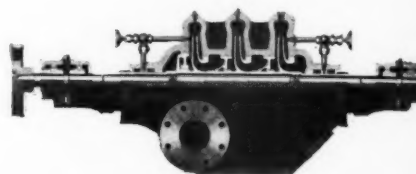
All HAZLETON pumps were designed for mine duty, and especially for handling acid water. Over 92 percent of our entire shop production is consumed by coal mining companies who want pumps, and accessories, made for the severe conditions found in and about mines. Wearing parts such as shaft sleeves, impeller and casing rings, shafts, etc., are from 50 percent to 80 percent heavier than those found in fresh water pumps. There are no small or delicate parts in these pumps. All parts are machined to gauge and are interchangeable. Almost all repair parts can be shipped from stock.



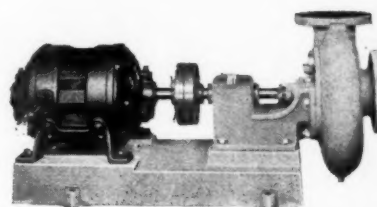
A six-inch ten stage pump, 800 G.P.M., 920 ft. head, driven by a 300 H.P. motor. Three of these units in service at Glea Alden Coal Co.'s properties.



Section of two stage pump. Impellers back to back, eliminating extra sealing rings. These two stage elements can be combined to form four, six and eight stage pumping units ranging in capacity from 150 to 5,000 G.P.M. and suitable for heads up to 1,000 ft. This is a simple, rugged and efficient pump for mine duty.



Series volute pump, balance disc construction, for fresh water. Not recommended for mine drainage service but makes an excellent fire pump, or can be used for general water supply. Balance disc method of neutralizing end thrust reduces sealing rings to minimum. Made for 200 to 1,500 G.P.M. against heads from 200 to 1,000 ft.



One of a number of open runner pumps made in several sizes and styles for 100 to 1,000 G.P.M., heads up to 80 ft.

BARRETT, HAENTJENS & CO.

WORKS - HAZLETON, PENNA.

BRANCHES AND REPRESENTATIVES

PITTSBURGH
PENNA.

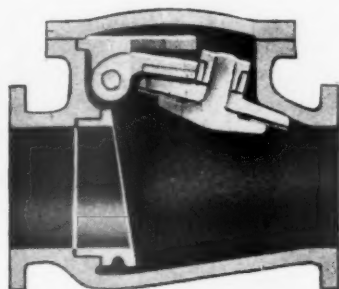
FAIRMONT
W. VA.

ST. LOUIS
MO.

BIRMINGHAM
ALA.

HOUGHTON
MICH.

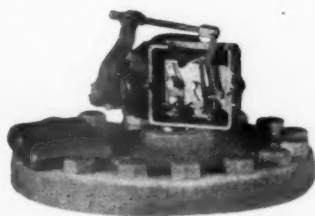
CENTRIFUGAL PUMP ACCESSORIES



A Rugged Check Valve For Mine Duty

All parts very heavy. Hinge pin of 6-in. valve is 1-in. dia. Interior parts easily removed, come out as unit. Only one nut inside valve, and that one is big. Valve seats quietly and holds tight. Free water flow through body.

Over 71 percent of these valves are bought by those who have used them and compared with others.



Check Valve Safety Switch

Connected to a signal to indicate when pump is running or as safety device to shut down if pump loses its water. When check flap is up switch closed, when flap falls switch opens. Action is positive, switch very rugged.

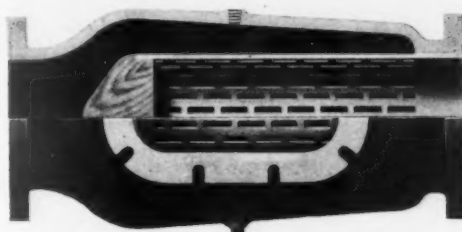


Gauge Protector

Placed between acid water connection and pressure gauge this device protects interior parts of gauge from destruction by acid and preserves accuracy of gauge.

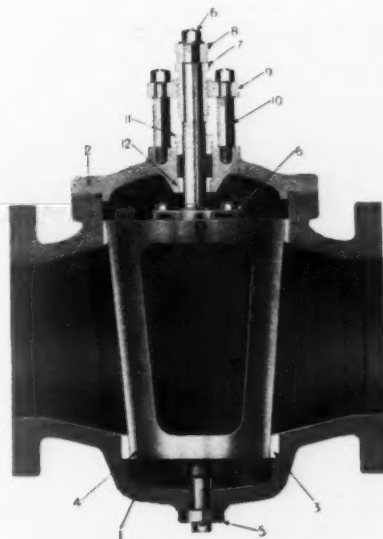
Pocket of protector filled with oil so gauge works under oil pressure, and water cannot corrode pressure tube.

Made of cast acid resisting bronze. Saves its cost many times over.



An Easily Cleaned Suction Strainer

Can be placed anywhere in suction pipe where it will be accessible for inspection or cleaning. Has hinged hand-hole plates on both sides. Basket is of cast acid resisting bronze.



Plug Valve Outlasts Several Gate Valves

For acid mine water pipe lines. Tests have shown that this valve lasts from 3 to 12 times as long as a gate valve.

BARRETT, HAENTJENS & CO.

WORKS - HAZLETON, PENNA.

BRANCHES AND REPRESENTATIVES

PITTSBURGH
PENNA.

FAIRMONT
W. VA.

ST. LOUIS
MO.

BIRMINGHAM
ALA.

HOUGHTON
MICH.



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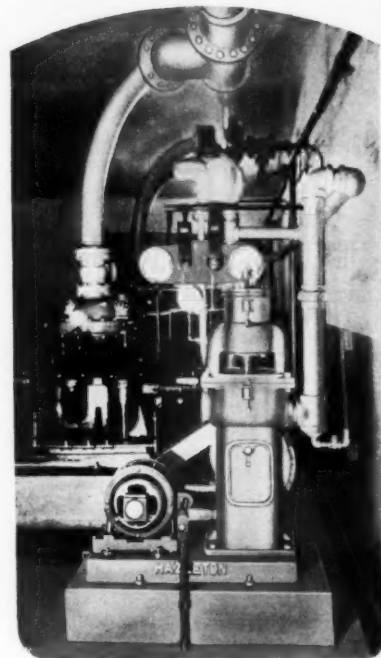
CENTRIFUGAL PUMP ACCESSORIES

Automatic Control for New Or Old Pumps

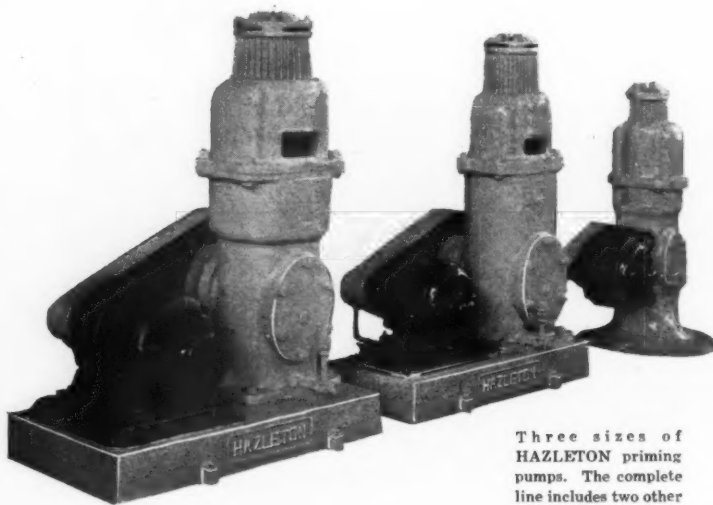
We manufacture automatic pump control equipment for centrifugals operating under all sorts of conditions, making the pumps start and stop according to the water level in the sump, the amount of water in a tank, or under the control of a push button located at any point.

A pump made automatic with our equipment can be operated without an attendant—in fact such a unit need be inspected but once a day. This feature saves from \$100 to \$600 per month, depending upon wage rates and the number of pump runners that would otherwise be required.

HAZLETON automatic pumping systems protect the pump against damage due to loss of water, air leaks in the suction connections or a blocked intake. Automatic pumping is no longer an experiment. We have made over a hundred pumps self-operative and can furnish an imposing list of references, giving data on existing installations that are making pump operation safer and vastly less expensive. One company alone saves over \$10,000 per year with our automatic control.



An automatic pumping installation at the Nemacolin, Pa., mine of the Buckeye Coal Co., a subsidiary of the Youngstown Sheet & Tube Co.



Three sizes of HAZLETON priming pumps. The complete line includes two other motor-driven pumps and two hand-operated primers.

Priming Pump Ends Foot Valve Troubles

The HAZLETON priming pump is used to fill a centrifugal pump with water by exhausting the air from the pump casing and suction pipe. This method is more satisfactory than using a foot valve as it does away with the danger of water hammer at the foot valve, and eliminates the annoyance and expense due to chips, etc., interfering with the proper operation of the valve flap.

BARRETT, HAENTJENS & CO.

WORKS - HAZLETON, PENNA.

BRANCHES AND REPRESENTATIVES

PITTSBURGH
PENNA.

FAIRMONT
W. VA.

ST. LOUIS
MO.

BIRMINGHAM
ALA.

HOUGHTON
MICH.

"VITROX"

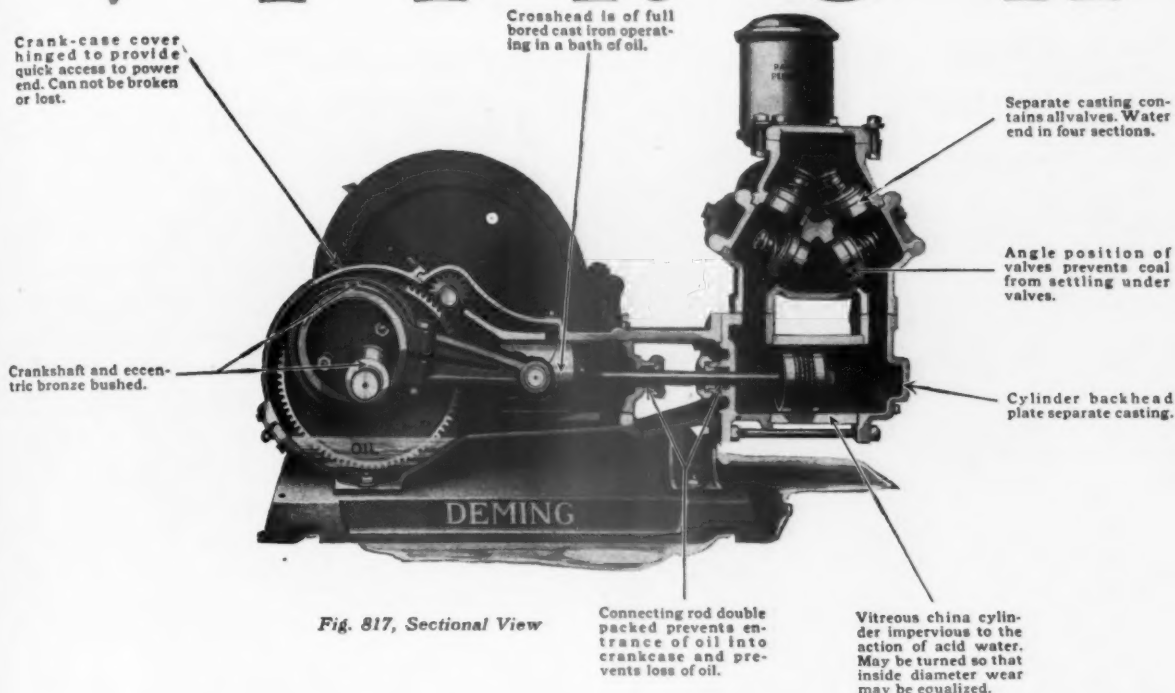


Fig. 817, Sectional View

For Mine Gathering Service

YOU are invited to see the Deming Vitrox Double Acting Mine Pump Fig. 817 at Booth No. 9 at the National Mine Show, Cincinnati, Ohio.

The pump is equipped with glass cover plates over the suction and discharge

valves so that valve action may be seen while the pump is in operation.

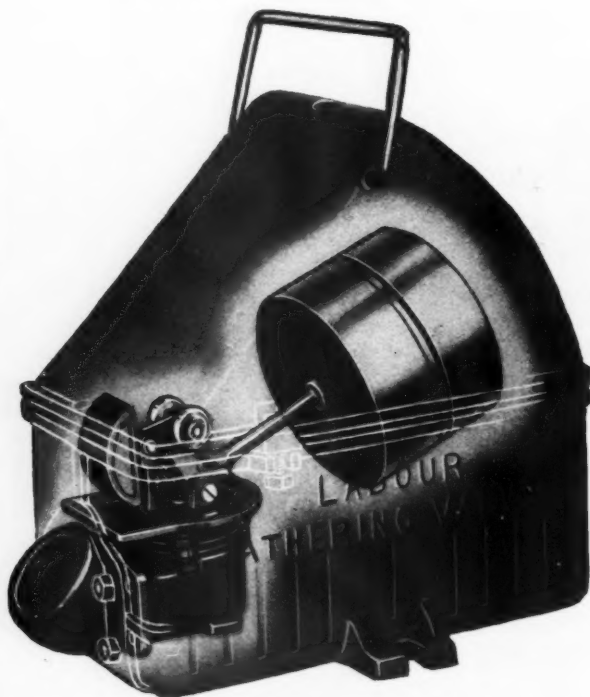
Where acidulous water is not present Deming "Oil-Rite" Double Acting Piston Pump No. 896 has points of superiority which recommend it to all operators.

THE DEMING CO., Est. 1880, Salem, Ohio

Deming

HAND AND POWER PUMPS FOR ALL USES

IMAGINE! — A pump man stationed at each suction opening of your gathering pumps and continuously regulating the flow of water to the pumps by means of hand operated valves.



PHANTOM VIEW OF GATHERING VALVE

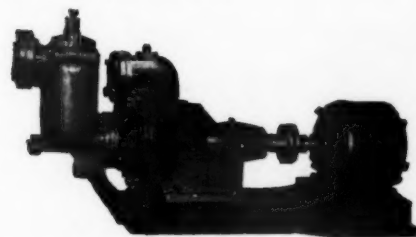
LA BOUR PUMPS produce a positive suction without the use of valves and will handle dirty and corrosive water. The pumps are made in a variety of sizes for low head work and a choice is available of motor, belt, or gasoline engine drive.

THIS would not be practical? Of course not, although it would give you ideal pump operation. However—you can get this perfect control by equipping each suction opening with a LA BOUR GATHERING VALVE which is inexpensive to install and costs nothing to operate.

These automatic valves are small, portable, positive in operation, and are controlled by the water level.

They are made entirely of non-corrosive materials and combine the functions of control and foot valves.

These valves may be used with any pump which will handle some air, but the ideal combination is with LA BOUR GATHERING PUMPS, which are of the centrifugal type, are self priming, and actually pump air.



TYPE "S" GATHERING PUMP

Send for Bulletins No. 28 and No. 29 describing the valves and pumps. See this equipment in operation, booths No. 25 and No. 60, American Mining Congress, Cincinnati.

THE LABOUR COMPANY

CHICAGO HEIGHTS, ILLINOIS

De Laval Steam Turbine Co.



LOCAL OFFICES

Atlanta Cleveland Helena
Boston Denver Houston
Charlotte Duluth Indianapolis
Chicago Havana Kansas City

Trenton, New Jersey

Los Angeles
Montreal
New Orleans

New York
Philadelphia
Pittsburgh

LOCAL OFFICES

Portland, Ore. Seattle
St. Paul Spokane
Salt Lake City Toronto
San Francisco Vancouver

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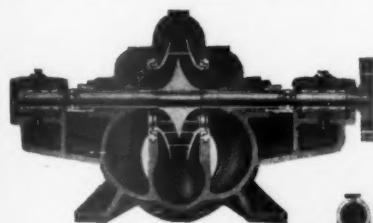
Manufacturers of Steam Turbines, Centrifugal Pumps, Centrifugal Blowers and Compressors, Double Helical Speed Reducing Gears, Worm Reduction Gears, Hydraulic Turbines, Flexible Couplings and Special Centrifugal Machinery

CENTRIFUGAL PUMPS

De Laval Centrifugal Pumps are characterized by conservative speeds, high class materials, construction on a limit-gage, interchangeable basis, guaranteed efficiency and capacity, and a comprehensive system of testing, by which the fulfillment of these guarantees is demonstrated.

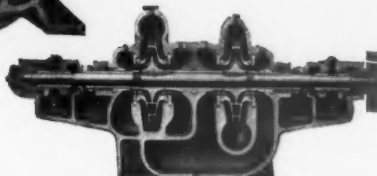
High efficiency is promoted by the use of De Laval labyrinth wearing rings, which prevent leakage from discharge to suction. In contrast to the ordinary flat ring, they combine long life and ample clearance.

The low starting torque and high efficiency of De Laval centrifugal pumps are of great value where pumps are to be driven by electric motors, as is also the self-limiting power characteristic. De Laval pumps can be driven by self-starting synchronous motors.



De Laval Single Stage Pump

De Laval Series Multi-stage Centrifugal Pump



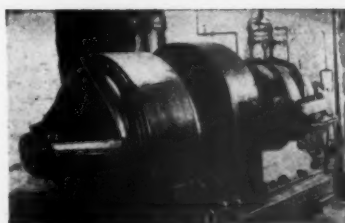
The De Laval Series Pump is particularly recommended where a multistage pump is required. The special form of casing gives high efficiency without recourse to diffusion vanes. The impellers are of the double suction type and are perfectly balanced.

De Laval Mine Pumps are specially constructed of acid resisting metal.

Among well known mining companies using De Laval Pumps are the Berwind-White Coal Mining Co., the Pittsburgh Coal Co., the H. C. Frick Coke Co., the Bethlehem Mines Corporation, St. Bernard Mining Co., the United States Coal & Coke Co., the Consolidation Coal Co., the Washington Coal & Coke Co., the Vesta Coal Co., W. J. Rainey, Inc., etc.



De Laval centrifugal pump driven by a three-phase induction motor pumping 1200 gal. of water per min. against a head of 115 ft.



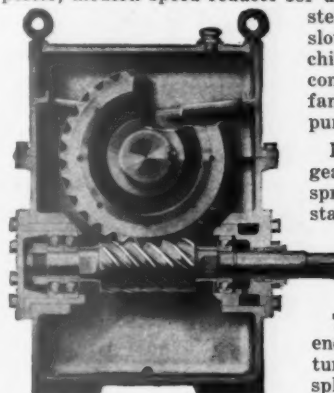
This De Laval pump has been delivering 2,000 gal. of mine water per min. against 253 ft. head at 1165 r. p. m. since the latter part of 1920.

De Laval Boiler Feed Units are designed, manufactured and tested, complete, in one plant and under the supervision of one staff of engineers, and sold and guaranteed by one organization.



De Laval Velocity Stage Turbine Driven Boiler Feeder

The DE LAVAL WORM REDUCTION GEAR is a superior, modern speed reducer for use with electric motors or steam turbines, for driving slow or moderate speed machinery, such as crushers, conveyors, hoists, cableways, fans, compressors, hoppers, pumps, screens, etc.



Section through axis of worm shaft of De Laval Bottom Drive Worm Reduction Gear

It takes the place of open gear trains, or chains and sprockets. It permits of standardizing on high speed motors, which cost less and are more efficient than standard or slow speed motors.

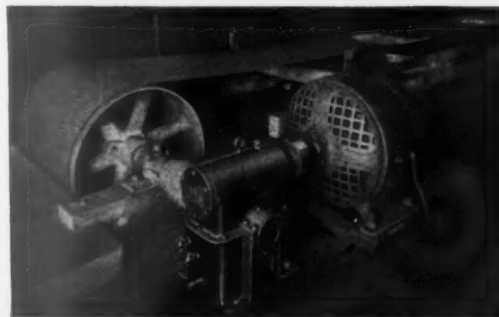
The complete reduction is enclosed in a dust and moisture-proof casing, which is split horizontally in the plane of the center line of the wheel shaft, the lower half containing a large oil reservoir.

The worm and wheel and the bearings are continuously lubricated by a splash or pressure system according to conditions. The only attention required is to see that the proper oil level is carried in the casing.

The De Laval Worm Reduction Gear is built with the driving worm either at the top or at the bottom, and with the driven machine either at the right or the left. Vertical shaft drives are also supplied. Single reductions are built for ratios up to 100 to 1, while double reductions provide for all higher ratios.

GUARANTEES, Etc.

All De Laval apparatus is built on a limit-gage, interchangeable basis. The performance of every machine is guaranteed, both as to capacity and efficiency, and a complete test is carried out before shipment.



De Laval Worm Reduction Gear driving horizontal belt conveyor handling wet coal. The motor develops 5 hp. at 825 r.p.m., which is reduced to 35 r.p.m. for the pulley.

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DRAINAGE STANDARDS

THIS useful division of the Handbook of Standard and Approved American Coal Mining Practice consists of 56 pages of condensed and comprehensive information. It is divided into five main sections:

1. Pumps for Development Work.
2. Permanent Pumping Stations.
3. Natural Drainage.
4. Unwatering Abandoned Workings.
5. Mine Water and Its Action Upon Mine Drainage Equipment.

These sections are developed by such topics as are here given for the first section:

1. Location, type, capacity and performance of pumps; motor and controls; location and installation of pipe lines; discharge lines and piping; construction of stations; sumps; general recommendations for the manufacture and selection of mine pumps.

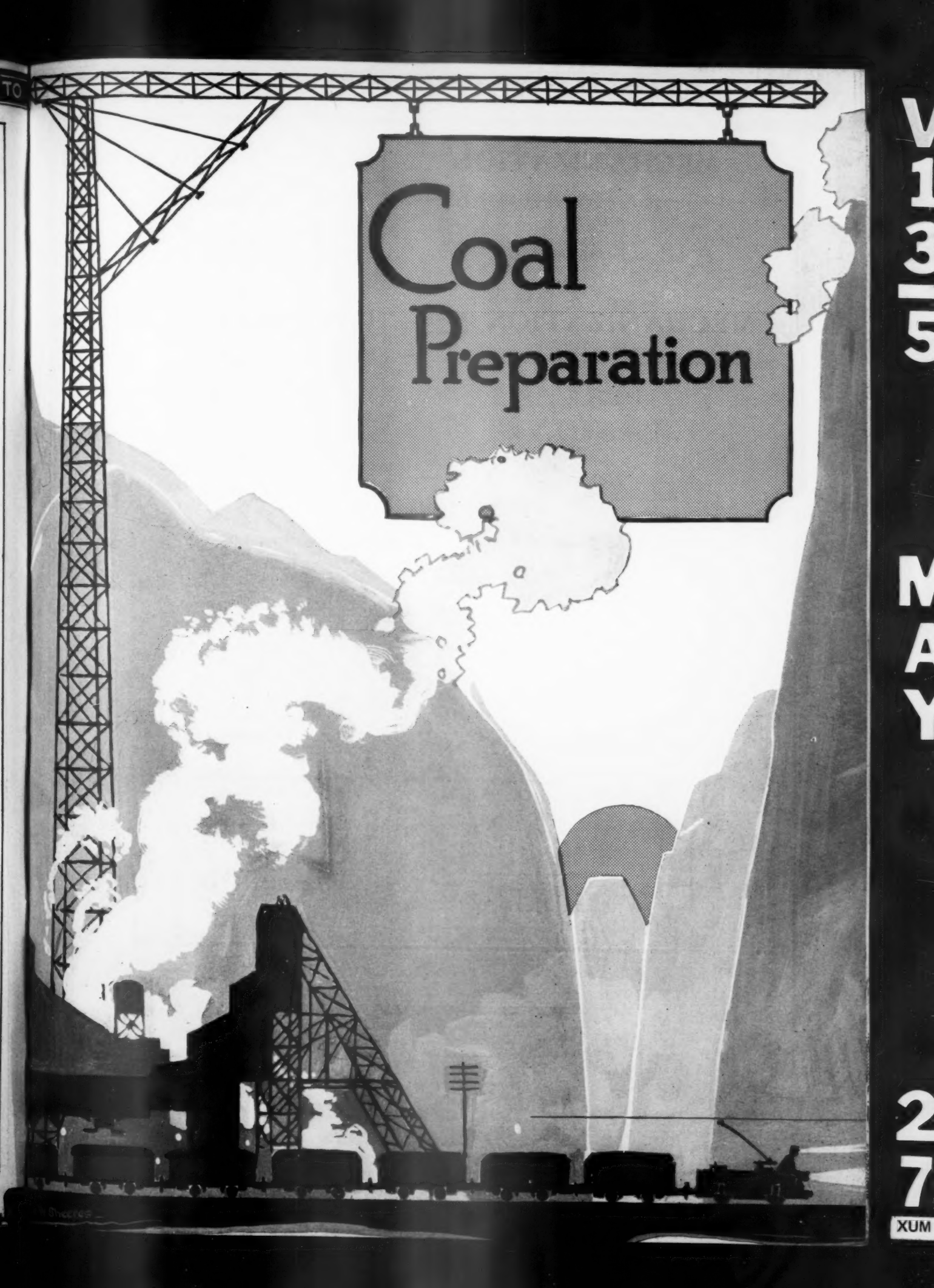
Standard practice in priming piston, plunger and centrifugal pumps, semi-remote control; safety precautions; and attendant.

The other sections are developed as fully, and make up an exceedingly useful and workable compendium of practical drainage knowledge.

*For further outline of the scope of the Handbook
turn to advertising page number 119*

TO

Coal Preparation



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MECHANIZATION → { LOW MINING COSTS
BUT
DIRTY COAL

MECHANIZATION AND → { LOW MINING COSTS
AND
CLEAN COAL
RHEOLAVEUR
WASHING

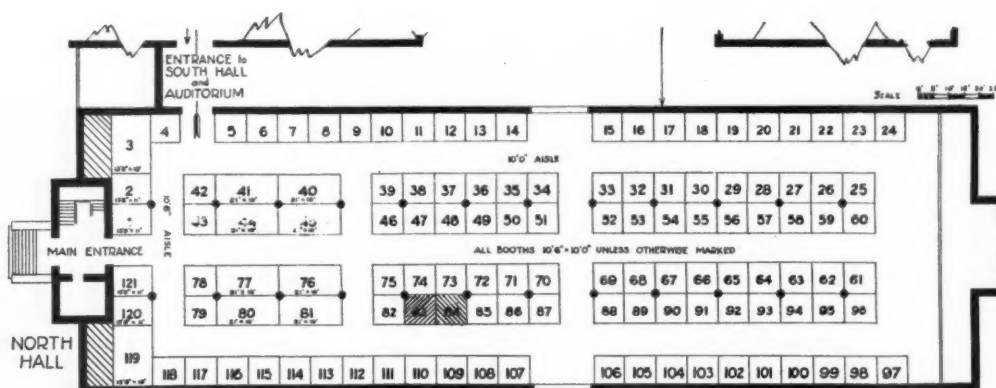
Call at Booths 83 and 84

National Exposition, Coal Mine Equipment

The American Mining Congress

Cincinnati, Ohio, May 16 to 20, 1927

For More Information

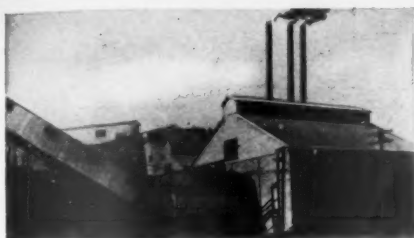


American Rheolaveur Corporation

NEW YORK OFFICE
120 Broadway

WILKES-BARRE OFFICE
911 Coal Exchange Bldg.

The
Rheolaveur
CURRENT WASHER



COKEDALE WASHERY
American Smelting & Refining Co.

Some Rheolaveur

Plants in U. S. A.

Total Annual

Capacity

4,200,000 Tons



SILT PLANT, GOOD SPRING BREAKER
Philadelphia & Reading Coal & Iron Co.



LOOMIS BREAKER
Glen Alden Coal Co.

8

Additional Plants

Now Being

Designed and Erected

Total Annual

Capacity

2,185,000 Tons

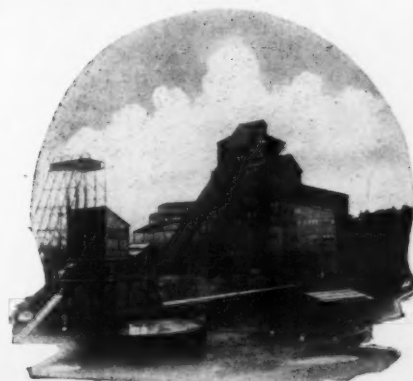
American Rheolaveur Corporation

NEW YORK OFFICE
120 Broadway

WILKES-BARRE OFFICE
911 Coal Exchange Bldg.



LATTIMER No. 6 BREAKER
Pardee Bros. & Co., Inc.



HAZLETON SHAFT BREAKER
The Lehigh Valley Coal Co.

AN A-B-C-EXPLANATION of Chance Coal Cleaner Superiority



THE object of cleaning coal is to remove the incombustible impurities—chiefly slate.

These impurities, no matter what their other physical characteristics may be, always weigh more than pure coal of equal size. Pure slate is approximately 50 per cent heavier than pure coal.

This difference in weight, as between coal and its impurities, is generally recognized as the one sound and sure basis for separating the two. Laboratory "float and sink" tests to determine the best results that can possibly be secured by cleaning coal depend on it exclusively. Practically every method of coal cleaning depends on it directly or indirectly. But the Chance Coal Cleaner is the only commercial coal cleaning device that makes use of this difference in weight directly in exactly the same way that it is employed in Laboratory "float and sink" tests.

Obvious Facts

Any method of cleaning coal that seeks to separate pieces of slate from pieces of coal by dependence on a difference in their shape or surface condition is confronted by these facts: All slate is not rough and all coal is not smooth; all slate is not flat and all coal is not cubical. A large percentage of coal is flat and a large percentage of slate is cubical.

Any method of cleaning coal that seeks to separate slate from coal by dependence on the faster falling of the heavy slate or on its greater frictional resistance to horizontal movement is confronted by the obvious fact that a large piece of coal and a sufficiently small piece of slate will fall at the same rate and will offer like resistance to horizontal flow. Such methods as these require preliminary sizing of the raw coal into classes that will permit subsequent separation. But it is manifestly impracticable to screen coal even by close screening, so as to obtain a product in which all, or even nearly all, of the pieces are of the same size and shape.

Therefore, to separate slate from coal with exactness in one operation it is imperative that a method be used that is entirely independent of the size, shape or surface condition of the various pieces.

Only Exact Method Known

The only method known to us in which size, shape or surface condition does not affect the separating action is the Chance process of SAND FLOTATION. This depends on flotation alone to secure complete and exact separation.

For example: To separate all sizes and shapes of stone from all sizes and shapes of wood, the simple plan is to place this mixture of stone and wood in water. Then all the stone, regardless of its size, shape or surface, will sink and all the wood, regardless of its size, shape or surface, will float.

Exactly the same action takes place in the Chance Coal Cleaner in separating slate and coal. The slate sinks as does the stone and the coal floats as does the wood.

In the Chance Cleaner, instead of water alone, a mixture of sand and water is used. This mixture when agitated makes a fluid in which slate sinks and coal floats. (The sand required to maintain this flotation medium is from 2 to 6 lbs. per ton of coal shipped, depending on the character of the material treated.)

Unaffected by Changes in Feed

In the example referred to above it is evident that the amount of mixed stone and wood that is fed into the water may be increased or decreased without changing the result. It is also evident that the proportion of stone to wood may be increased or decreased and still all the stone will sink and all the wood will float.

Similarly with the Chance Cleaner, the quantity of the feed may be increased or decreased without in the least affecting the separation of slate and coal and the quality of the feed may vary from a low percentage of slate to a high percentage of slate or vice versa and still all the slate will sink and all the coal will float.

These results are obtained by the Chance Cleaner, without adjustment, as easily and naturally as in the case of stone and wood and water. But with methods depending on hydraulic classification, as in jigs, launders, etc., adjustments must be made to meet these varying conditions as guessed at by the operator, if indeed they can be made at all.

In coal cleaning apparatus of the type just referred to, such as jigs and launders, separation when completed leaves the coal in contact with the refuse and the problem then remains to remove the coal without taking any refuse or to remove the refuse without taking any coal. In the Chance Cleaner, the refuse sinks promptly and definitely away from the floating coal and remains at a distance of at least several feet. Thus the removal of slate does not affect the coal and the removal of coal does not affect the slate.

The Underlying Reason

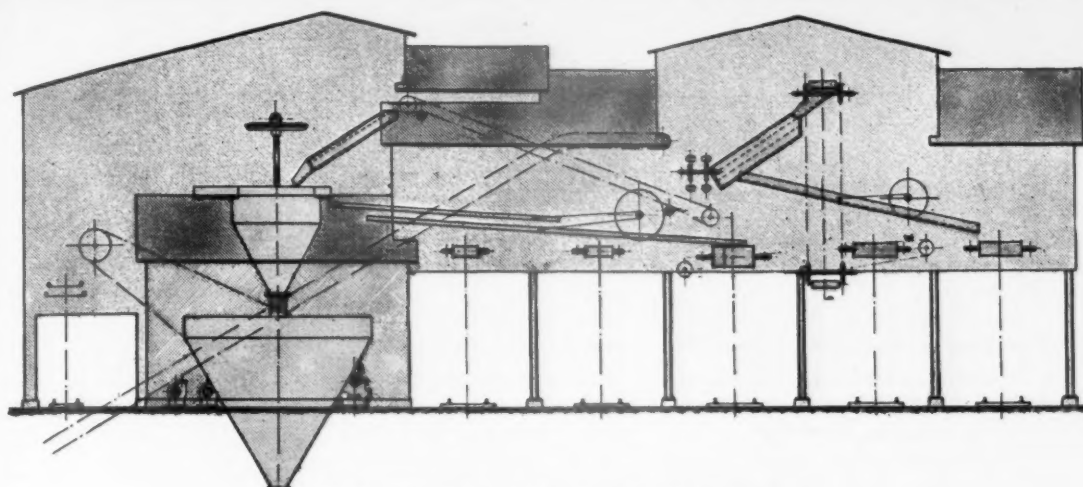
The basic difference between the direct gravity separation of the Chance Coal Cleaner and the indirect methods used by all other coal cleaning devices, permitting as it does the operation of large units, without preliminary sizing or storage of the raw coal and without regard to changes in the character of the feed, is the underlying reason why Chance Sand Flotation produces a GREATER QUANTITY of uniformly high grade coal, with LOWER operating and investment costs than has hitherto been possible.

H. M. Chance & Co.
Engineers
Drexel Building
Philadelphia, Penna.

**CHANCE
COAL CLEANER**

M. A. WALKER, GENERAL MANAGER
MEARS BUILDING, SCRANTON PENNA.

H. O. Staples
Sole Anthracite Licensor
Mears Building
Scranton, Penna.



THE MT. UNION TIPPLE

Cleaning Bituminous Coal for the
ROCKHILL COAL AND IRON COMPANY

by the
CHANCE SAND FLOTATION PROCESS

This Tipple, with an hourly capacity of 550 Tons, has been in continuous use since October 1st, 1925. The use of Sand Flotation has secured:-

Increased Sales Price
Expanded Market
Decreased Idle Time
Lowered Mine Cost

SAND FLOTATION

THE COAL CLEANING & EQUIPMENT CORP.,
*Bituminous Licensors for the States of
Pennsylvania, Ohio and Maryland*
260 South Broad Street,
PHILADELPHIA, PENNA.

H. M. CHANCE & Co.,
*Bituminous Licensors for
all other Districts.*
Drexel Building,
PHILADELPHIA, PENNA.



Pneumatic Coal Separation Record

1920-1925

Annual separating capacity installed 1,776,000 tons

ST. LOUIS, ROCKY MOUNTAIN & PACIFIC COAL CO., Brilliant, N. M.
McALLESTER-EDWARDS COAL COMPANY, Pittsburgh, Okla.
AMERICAN COAL CO., OF ALLEGHENY COUNTY, McComas, W. Va.
GULF SMOKELESS COAL COMPANY, Wyco, W. Va.
WEST CANADIAN COLLIERIES, Limited, Blairmore, Alberta, Canada.
NATIONAL CARBON COMPANY, Niagara Falls, N. Y.
SEMET SOLVAY COKE COMPANY, Detroit, Mich.
PREMIER RED ASH COAL CORPORATION, Red Ash, Va.
HEWORTH COAL COMPANY, Limited, Heworth, County Durham, England.

1926

Annual separating capacity installed 2,784,000 tons

INTERNATIONAL COAL & COKE CO., Limited, Coleman, Alberta, Canada.
McGILLIVRAY CREEK COAL & COKE CO., Coleman, Alberta, Canada.
JOHN BOWES & PARTNERS, Limited, Wardley, County Durham, England.
*AMERICAN COAL CO., OF ALLEGHENY COUNTY, McComas, W. Va.
TURKEY GAP COAL & COKE COMPANY, Modoc Colliery, Wenona, W. Va.
McALPIN COAL & COKE COMPANY, McAlpin, W. Va.
SUPERIOR POCAHONTAS COAL COMPANY, Davy, W. Va.
NEW RIVER & POCAHONTAS CONSOLIDATED COAL CO., Berwind,
W. Va.
ALTHAM COLLIERIES, Limited, Accrington, Lancashire, England.
*PREMIER RED ASH COAL CORPORATION, Red Ash, Va.

So far 1927

Annual separating capacity sold 2,664,000 tons

PEASE & PARTNERS, Ltd., Thorne Colliery, Near Doncaster, Yorkshire, Eng.
HORDEN COLLIERIES, Limited, Horden Colliery, County Durham, Eng.
*WEST CANADIAN COLLIERIES, Limited, Bellevue, Alberta, Canada.
HEBBURN COLLIERIES, Limited, Newcastle, Australia.
*NEW RIVER & POCAHONTAS CONSOLIDATED COAL CO., Berwind,
W. Va.

*Repeat orders.

Total 7,224,000 tons

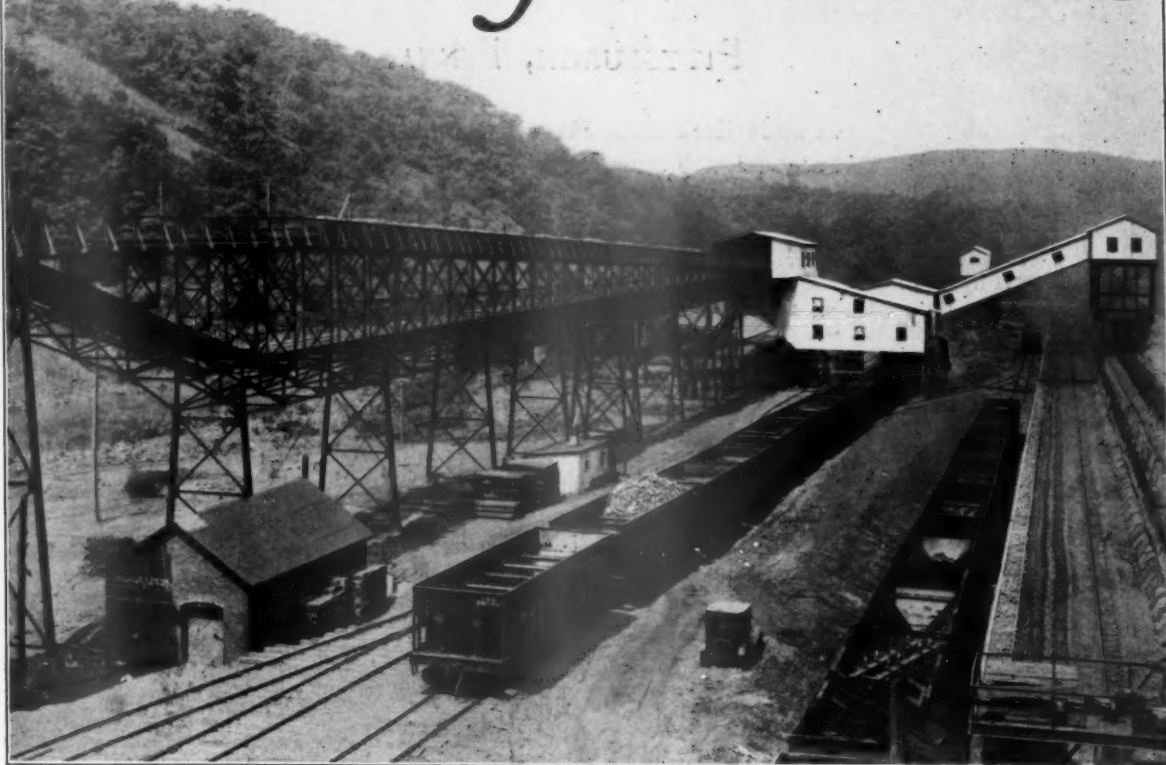
AMERICAN
COAL CLEANING CORPORATION
Welch, W. Va.

COAL MINE

TRADE MARK REGISTERED

FAIRMONT

EQUIPMENT

The **HAND of PROGRESS**

Progress is the keynote of America's success. The Coal Industry, like other industries, is progressing.

The Snowdon Coke Company, near Brownsville, Pa., replaced this year, their old tipple with this modern steel tipple.

Fairmont Engineers, Fairmont Shops, and Fairmont Erection crews did the job.

We are at your service—no obligation

FAIRMONT MINING MACHINERY COMPANY
FAIRMONT, W. VA.

**FAIRMONT ENGINEERING PRACTICE IS BACKED
BY A QUARTER CENTURY OF EXPERIENCE**

HEYL & PATTERSON, Inc.

(Established 1887)

CONTRACTING ENGINEERS

PITTSBURGH, PENNA.

Prepare Estimates, Plans and Specifications
and Design, Fabricate and Erect the following
Products

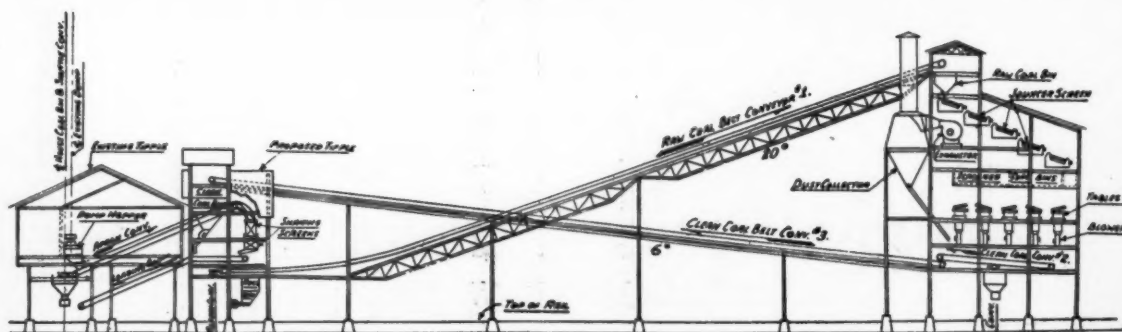
Bradford Patent Coal Breakers
Car Haulage Systems
Coal and Ash Handling Apparatus
Coal and Coke Crushers
Coal and Coke Plants for By-product Ovens
Coal and Coke Storage Bridges and Cranes
Coal Washing Plants

Loading Booms
Pig Iron Casting Machines
Pulverized Coal Equipments
Refuse Disposal Cars
Tipples and Equipment
Transfer Cars
Unloading Towers

Pneumatic Cleaning Plants for Bituminous Coal



BITUMINOUS COAL TIPPLE AND PREPARING PLANT—Capacity, 700 Tons per Hour



PNEUMATIC CLEANING PLANT FOR BITUMINOUS COAL—Capacity, 250 Tons per Hour
(Under Construction)

It IS A New Era!



For separating solids from liquids

The coal recovery is 99% or better of the carbon content of feed.

For fine coal sizes 1-50th in. up to 1-2 in. capacity 100 tons per day with 3% to 8% moisture.

For Sludges---capacity 3 tons per hour---12% to 16% moisture.

THE LAUGHLIN CONTINUOUS CENTRIFUGE is a new development in the separation of solids and liquids. Drying, washing or cleaning are accomplished in one operation, the feed to and discharge from the machine being continuous.

RECENT PERFORMANCES ON COAL—

Powdered coal:

3 tons per hour at 16% moisture.
Ash content reduced from 12% to 7%.

Cleaning obtained in—

| | Feed Percent | Filter Cake Percent |
|-------------------------|-----------------|------------------------|
| Alabama Coal (Do'omite) | 7.7 ash | 5.5 ash |
| Alabama Coal (Pratt) | 13.9 ash | 10.0 ash |
| Penna. (Broad Top) | 11.3 ash | 6.4 ash |
| Colorado | 20.0 ash | 14.0 ash |

Suitable for drying and cleaning fine coal, sludges, flotation concentrates, ore residues, clays, slimes, soap stock in oil, paper pulp, sugar, linters, sewage, etc.

Every Machine put in on an operating guarantee to fit your particular requirements

Laughlin Filter Corporation

120 BROADWAY



NEW YORK, N. Y.

See our
operating
exhibit in the
lobby at
Cincinnati

LAUGHLIN Continuous CENTRIFUGE

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XL

EQUIPMENT of PROVEN ABILITY for COAL PREPARATION



The satisfactory performance of Dorr machines is attested by a large number of operating installations.



Three of the Breakers using Dorr Equipment are illustrated above.

Let us send you a copy of our Bulletin, "Turning Slush Into Profit."



In both the Anthracite and Bituminous fields, Dorr Equipment has established an enviable record for producing results and reducing waste, when installed for

Cleaning and recovering fine coal
Clarification and recovery of water
Prevention of stream pollution
Neutralization of acid mine waters

The experience gained by our Engineers in designing over half a hundred installations for the coal field, supplemented by the knowledge acquired through contacts with countless similar operations in other industries, is at your disposal.

**THE DORR COMPANY
ENGINEERS**

247 PARK AVENUE

NEW YORK CITY

DENVER

LOS ANGELES

CHICAGO

WILKES-BARRE

JOPLIN

THE DORR CO. LTD
16 South Street London E.C.2

DORR G. m.b.H.
Joachimsthalerstr. 10, Berlin W.15

SOC. DORR ET CIE.
126, Rue de Provence Paris 8

INVESTIGATION

TESTS

DESIGN

EQUIPMENT

THE ROAD TO MECHANIZATION

We Owe No Allegiance To Any System—But Are Loyal to Successful Accomplishment

Below is pictured the Link-Belt Washery of the Pocahontas Fuel Company, Inc., McComas, W. Va., (Sagamore Plant). This is but one of five tipples and washeries which we have designed and built for this company.



The Link-Belt Tipple of the Nelson Fuel Company, Leslie, W. Va., prepares coal mined from the Sewell Seam; known as one of the softest of the smokeless coals. In order to secure a maximum of premium sizes it must be handled with extreme care.



The preparation plant above is that of the Spring Canyon Coal Co., Spring Canyon, Utah. The small sizes are dry cleaned, while the larger sizes are prepared on combination picking tables and loading booms, constructed so as to permit loading either box or gondola cars. Completely designed, equipped and erected by Link-Belt Company.



TO PRODUCE clean and properly sized coal are the main functions of the preparation plant. The method of cleaning may be any one of three systems or combination of one with the other.

- 1—Manual inspection and picking.
- 2—Separation of free impurities by dry mechanical methods.
- 3—Wet Concentration of the washery process.

The type of plant which should be constructed to produce the desired results can only be determined after a thorough investigation of all facts, by engineers experienced not only in theory, but also in practice.

Your problem in the hands of Link-Belt Engineers is assured of unprejudiced judgement—for we owe no allegiance to any system—but are loyal to successful accomplishment.

Link-Belt Equipment for the Coal Mine

Coal Tipples
Coal Washeries
Loading Booms
Picking Tables

Screens
Retarding Conveyors
Car Dumps, Car Hauls
Crushers

Boom Hoists
Locomotive Cranes
Crawler Cranes
Portable Loaders

Vibrating Screens
Face Conveyors
Spiral Separators
Manierre Box Car Loaders

Conveyors of Every Type
Chains, Wheels, Buckets
Silent Chain Drives
Roller Chain Drives

LINK-BELT COMPANY

Leading Manufacturers of Elevating, Conveying, and Power Transmission Machinery and Chains

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Pittsburgh - - - - - 335 Fifth Ave.
St. Louis - - - - - 3638 Olive St.

CHICAGO, 300 W. Pershing Road
Wilkes-Barre - 826 2nd National Bank Bldg.
Huntington, W. Va. - Robson-Prichard Bldg.

INDIANAPOLIS, 200 S. Belmont Ave.
Denver - - - - - 520 Boston Bldg.
Birmingham, Ala. - 229 Brown-Marx Bldg.

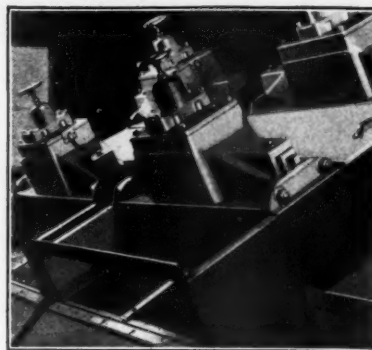
3104

LINK-BELT

Tipples and Washeries



Get These HUM-MER Advantages



HERE are the outstanding advantages that have prompted many coal operators in the United States as well as foreign countries to adopt the Hum-mer Electric Screen:—

Remarkable Sorting Action

An exceptional sorting action that assures effective separation even when the coal is wet.

Immense Output

The powerful electric vibratory action—1800 sharp impulses per minute—easily separates immense tonnages of coal in a wide range of sizes.

Less Power

Power requirements for operating Hum-mer Electric Screens are low—less than one horse-power per unit.

Absolutely no Lubrication

This tremendously important feature assures low maintenance costs and relief from costly shut-downs for repairs.

Continuous Operation

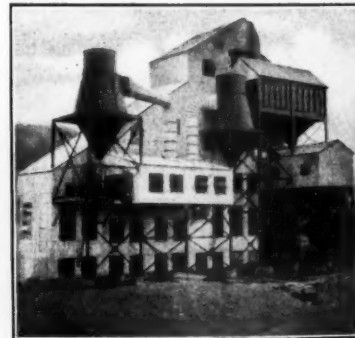
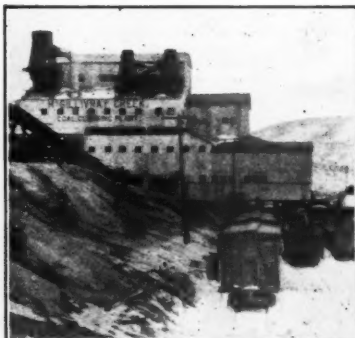
Twenty-four hours per day, week in and week out, the Hum-mer can be depended upon to operate continuously with a minimum of attention.

Low Cost Per Ton

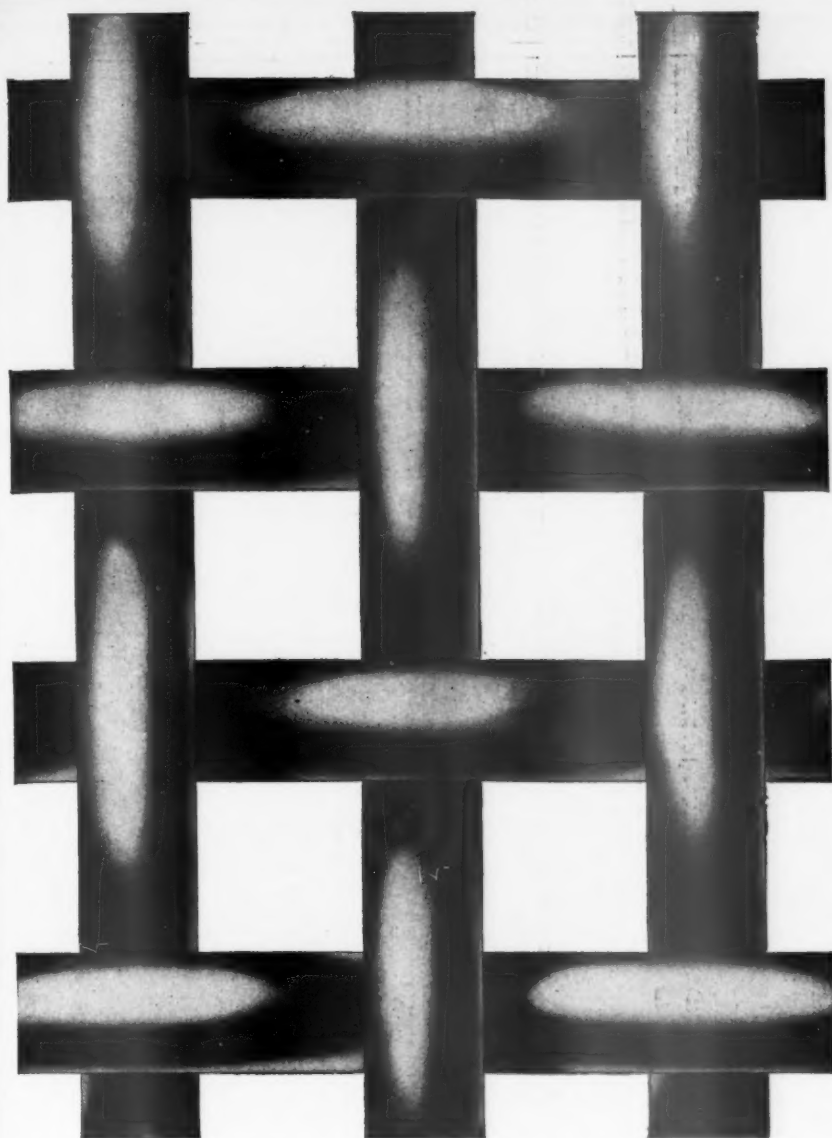
In reduced operating costs alone many producers have earned thousands of dollars by using Hum-mer Electric Screens.

Get these advantages—the book "Screening for Profit" will give you further particulars.
Send for your copy.

THE W. S. TYLER COMPANY, *Cleveland, Ohio*
Manufacturers of Woven Wire Screens and Screening Equipment



HUM-MER *Electric* SCREEN



When coal has passed across a properly selected woven screen, ALL undersize has been removed.

Even the heaviest woven screen has more holes per square foot than the closest punching practical for perforations to pass identical sizes.

This 1-inch screen of 11/16-inch bars has 50½ holes per square foot.

A 1-inch screen of No. 7 (.177-inch) wire has 104 holes per square foot.

We make a dozen other screens with 1-inch square holes — all having from 50 to 100 holes per square foot.

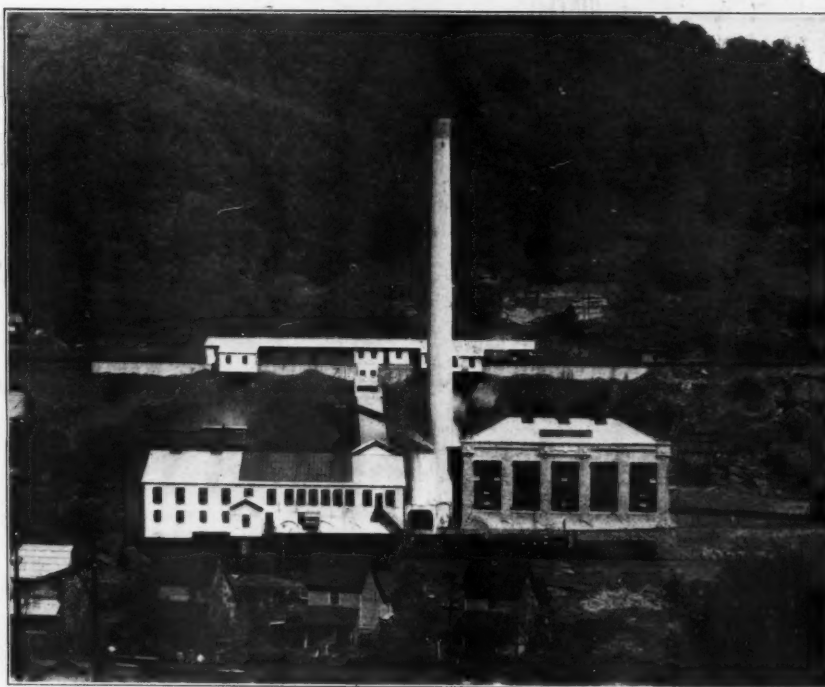
Wherever Your Market Lies,

*"Perfect" Preparation on Woven Screens reflects
in both the product and the price*

The LUDLOW-SAYLOR WIRE COMPANY St. Louis

"Perfect" Double Crimped Wire Cloth and Woven Screens

Pocahontas Fuel Company's Itman Tipple and Washery, Itman, W. Va. Capacity, 500 tons per hour. Coal Seam, No. 3 Pocahontas. Chain Hauls handle the loaded and empty mine cars. The Tipple is equipped with Shaker Screens, Picking Tables and Loading Booms for Lump and Egg. The smaller sizes are cleaned by means of The Pittsburgh Washing Jig.



Houston Coal Company's Keystone Tipple, Keystone, W. Va. Capacity, 500 tons per hour. Coal Seam, No. 3 Pocahontas. The Mine Cars are handled by Chain Hauls. The Tipple is a four-track one and equipped with Shaker Screens, Picking Tables and Loading Booms for Lump, Egg, and Nut, also Mixing Conveyors for making different mixtures.

The above plants are only two of the great many that have been designed and installed by

THE PITTSBURGH COAL WASHER COMPANY

ENGINEERS and CONTRACTORS

Office: Fulton Building, Pittsburgh, Penna.

Machine and Structural Shops: Ambridge, Penna.



Coal Handling Equipment

V
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XUM

These Units Make Outside Coal Handling Simple and Economical

The view below is of the storage yard at the mines of the Chicago, Wilmington & Franklin Coal Co., West Frankfort, Illinois, showing the Link-Belt "Built for Service" Locomotive Cranes loading railroad cars from storage. Ask our nearest office for a copy of Book No. 670.



The Portable Loader shown below is loading slack coal from railroad cars to storage at the mine of the Alamo Coal Company, Alamo, Colorado, to be reclaimed at a time when slack prices justify its sale. These low cost machines offer an effective and economical means for storage. Ask for Catalog No. 878.



The Link-Belt "All-Purpose" Crawler pictured above has an unusually wide range of application. It is universal for handling all kinds of bulk material, unloading sand from railroad cars to stock pile; loading coal from ground storage to railroad cars; creek dredging; back filling; excavating in light and medium soils, and general clean up work. Ask for Book No. 890.



NO ONE questions the economic value of being able to store slack coal to be reclaimed at a time when slack prices justify the sale; it is merely a question as to which one of the many systems available should be used.

Every type of coal storage equipment which has stood the test of efficient, practical operation is manufactured completely in our own plants. From this advantageous position, you can when consulting with a Link-Belt Engineer, be assured of unprejudiced advice concerning the equipment most suited to your requirements.

Write our nearest office for catalogs, and full information.

Link-Belt Equipment for the Coal Mine

Coal Tipples
Coal Washeries
Loading Booms
Picking Tables

Screens
Retarding Conveyors
Car Dumps, Car Hauls
Crushers

Boom Hoists
Locomotive Cranes
Crawler Cranes
Portable Loaders

Vibrating Screens
Face Conveyors
Spiral Separators
Manierre Box Car Loaders

Conveyors of Every Type
Chains, Wheels, Buckets
Silent Chain Drives
Roller Chain Drives

LINK-BELT COMPANY

Leading Manufacturers of Elevating, Conveying, and Power Transmission Machinery and Chains

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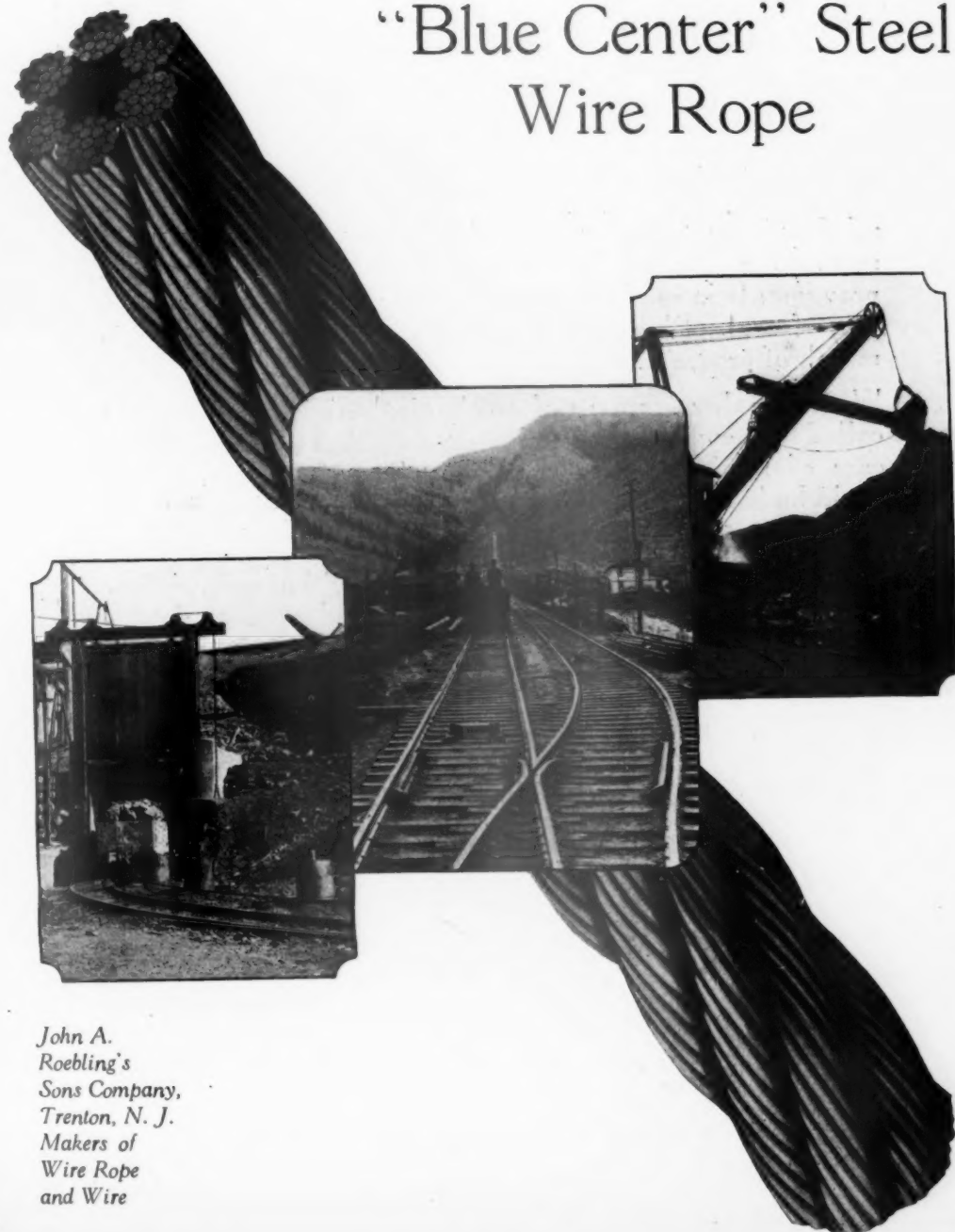
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LINK-BELT

Coal Handling Machinery

Roebling

"Blue Center" Steel
Wire Rope



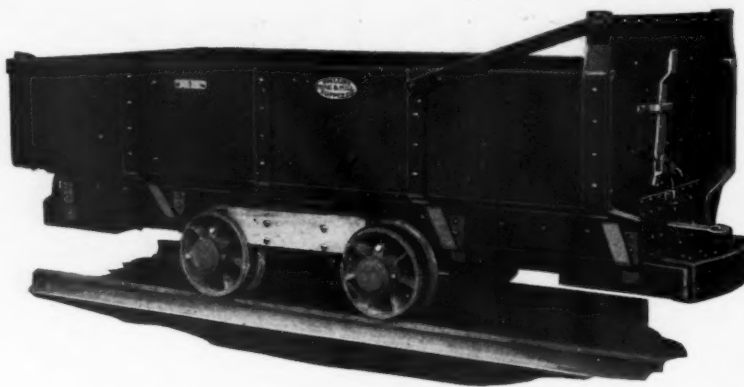
*John A.
Roebling's
Sons Company,
Trenton, N. J.
Makers of
Wire Rope
and Wire*

V
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XUM

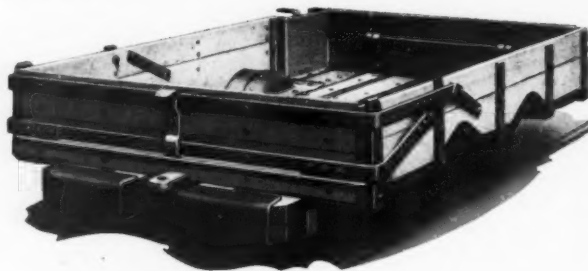


Sectional steel car, built for Consolidation Coal Co., equipped with Timken Roller Bearings.

A Lifetime of Service to the coal mining industry of the United States has witnessed marvelous changes in the consistent and continued improvements in methods and machinery used in the production of coal. Phillips has played a prominent part in this march of progress.

When the development of mechanical mining and loading called for new designs in mine cars, Phillips was ready with cars of minimum height and maximum capacity, which could be handled in conjunction with older equipment, and with all parts accessible to allow for ready servicing.

Honestly built, and with generations of "know-how" behind them, Phillips cars can be depended upon to fit the job, and to give good returns on the investment. Let us prove it!



The open side wheel covers reduce the capacity of the car less than 2 cu. ft. and are so designed as to allow for the free discharge of the coal.

PHILLIPS MINE AND MILL SUPPLY CO.

Mine Cars (steel or wood), Mine Car Wheels plain or roller bearing, Automatic Car Dumps, Gravity Rotary Dumps, Car Stops and Trip Controllers, Mine Run Weigh Hoppers.

Pittsburgh, Pa.

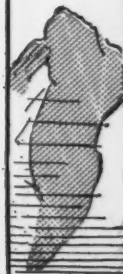
B & B Aerial Tramways

Have You a Waste Disposal Problem?

WE design and manufacture waste handling Aerial Tramways to meet your particular requirements, and guarantee satisfactory operation.

Estimates and illustrated catalog gladly furnished upon request. Write us about your conditions. Our engineers are at your service without obligation of any kind.

BRODERICK & BASCOM ROPE CO.
Saint Louis, Missouri



"HERCULES" RED-STRAND WIRE ROPE

REG. U.S. PAT. OFF.

*An Acid Steel product, every
wire of which is rigidly tested
to insure highest quality*

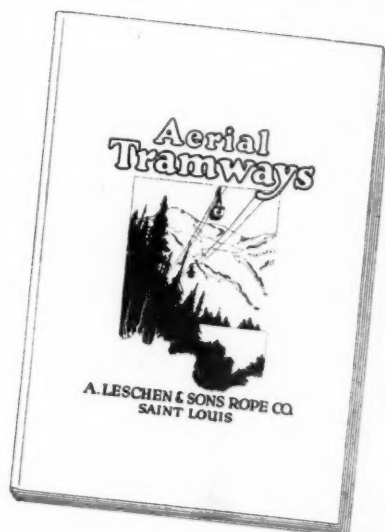
You can depend on "HERCULES" because we test every wire that goes into it, and every wire has proved by our tests that it has all qualities that hard work requires.

We particularly recommend this wire rope for use on mine hoists, inclines, mining machines, cranes, excavators and shovels. Its exceptional ability to stand up on such work has been proved by its service record.

Give "Hercules" a chance to show you what it can do. Try it on your hardest work and compare its "per ton handled cost" with that of other wire ropes—then decide which is the most economical.

"HERCULES" (Red - Strand) Wire Rope is made in both Round Strand and Patent Flattened Strand construction. Tell us how you use wire rope and we shall be glad to suggest the right kind for best results.

Transportation Problems?



If you are interested in the economical handling of coal, ore, or mine waste, write for our Catalog No. T-25. It describes our various systems of Aerial Wire Rope Tramways and illustrates many installations that are now in use.

Made Only By

**A. Leschen & Sons Rope
Company**

Established 1897

5909 Kennerly Ave.
ST. LOUIS

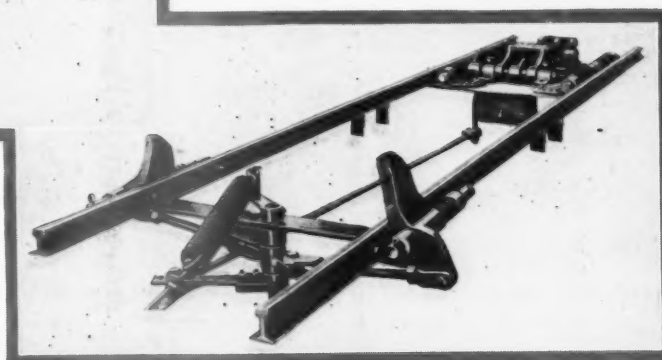
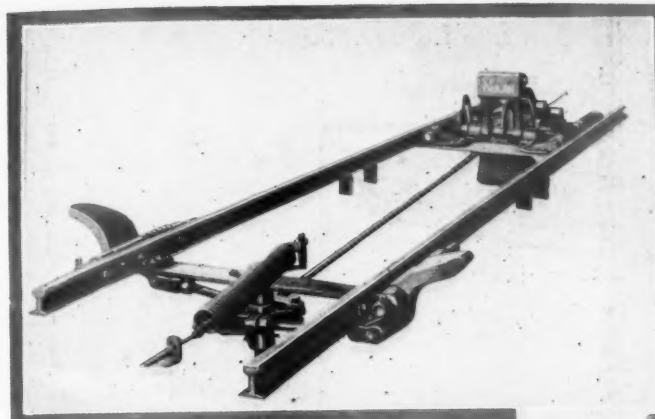
New York

Chicago

Denver

San Francisco

The new heavy duty BUMPER-STOP Feeder



SPECIAL ADVANTAGES

Heavy grades need not be changed.
All brakes may be loosened at once.
Long and heavy trips handled safely.
No injury to cars even where axles are weak.

THIS new Bumper-Stop Feeder is the direct result of an increasing demand for a feeder to handle extra heavy trips of cars on steep grades, especially where axles are weak. It combines the heavy duty advantages listed above with those of safety—the elimination of wrecks due to run-a-way trips—faster feeding and less labor. The Feeder is substantially built of the best steel, and designed to allow a wider margin of safety in operation. Used on tipples, at cages, or at any point where trips are handled. Safe and sure in operation and handles trips without jar or strain.

NOLAN EQUIPMENT

Rotary and Cradle Dumps
Retarders
Automatic Cagers
Automatic Feeders to Rotary, Crossover
and Kickback Dumps
Automatic Scale and Dump Feeders
Cage and Rotary Dump Stops
Other Equipment

See the models of this and our other equipment in operation at Cincinnati in Booth 68, or write to us for information and descriptive literature

THE MINING SAFETY DEVICE CO.

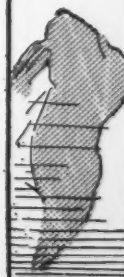
BOWERSTON, OHIO

SEE OUR EXHIBIT

AUTOMATIC
NoLAN

CAGERS & FEEDERS

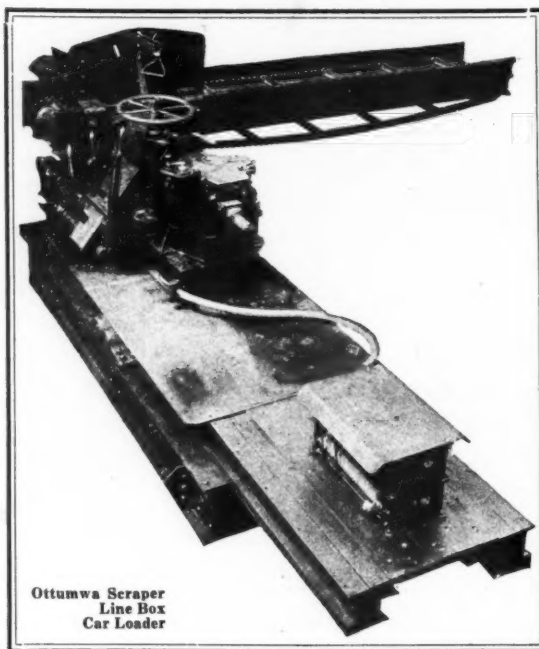
IN BOOTH No. 68



YOU WILL MAKE NO MISTAKE IN PURCHASING
THE OTTUMWA SCRAPER LINE BOX CAR LOADER

*Stop Gang Waste, Minimize Coal Breakage, Speed Up
Production, Eliminate Lost Time, Cut Down Labor
Costs and Save Money. One Man to Operate
an Ottumwa Loader Can Load Over 250
Tons of Coal Per Hour*

PAYS
BECAUSE
IT
SAVES



Ottumwa Scraper
Line Box
Car Loader

ELIMINATE
THE
COSTLY
LOADING
GANG

THE BEST WAY to be prosperous is to keep production costs down.

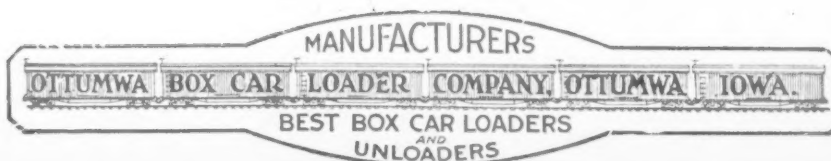
We can show you how a savings of at least 125% of the entire cost of an Ottumwa Loader can be made the very first year.

Broad as our claims are for the OTTUMWA BOX CAR LOADER, we are more than justified in making them by the performance of this efficient unit in plants all over the country. They are "Delivering The Goods," as a large number of satisfied users bear evidence.

OUR LATEST LITERATURE SHOULD BE ON YOUR DESK
SEND US YOUR ADDRESS AND WE'LL FOWARD IT BY RETURN MAIL

MODERNIZE! LOAD WITH THE OTTUMWA LOADER

Ottumwa
Box Car
Loader
Co.



Ottumwa,
Iowa.

Just hit the Clip!

What could be easier? Just hit the clip with any convenient tool. Carnegie Steel Mine Ties eliminate the many objectionable features of wood ties. No rotting or deterioration from repeated spikings. Light and easy to carry. So much less labor. So shallow that they save inches of headroom (quite important in low seams of coal).

Carnegie Mine Ties are made of Copper Steel. This copper content greatly retards corrosion. Double life!

See them on display at the
National Exposition of Coal
Mine Equipment, Cincinnati,
Ohio. May 16th to 20th

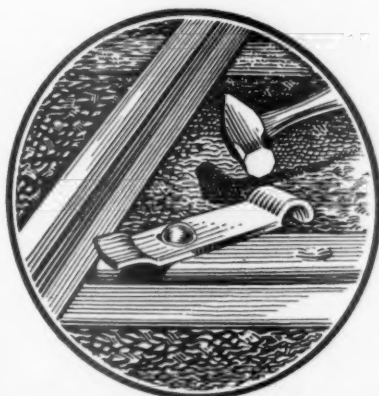
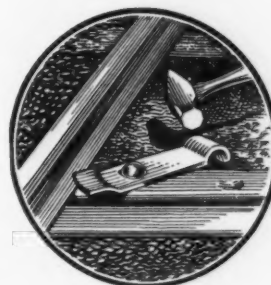
Spaces 114-115-116

CARNEGIE STEEL COMPANY

General Offices • Carnegie Building • 434 Fifth Avenue
PITTSBURGH PENNSYLVANIA

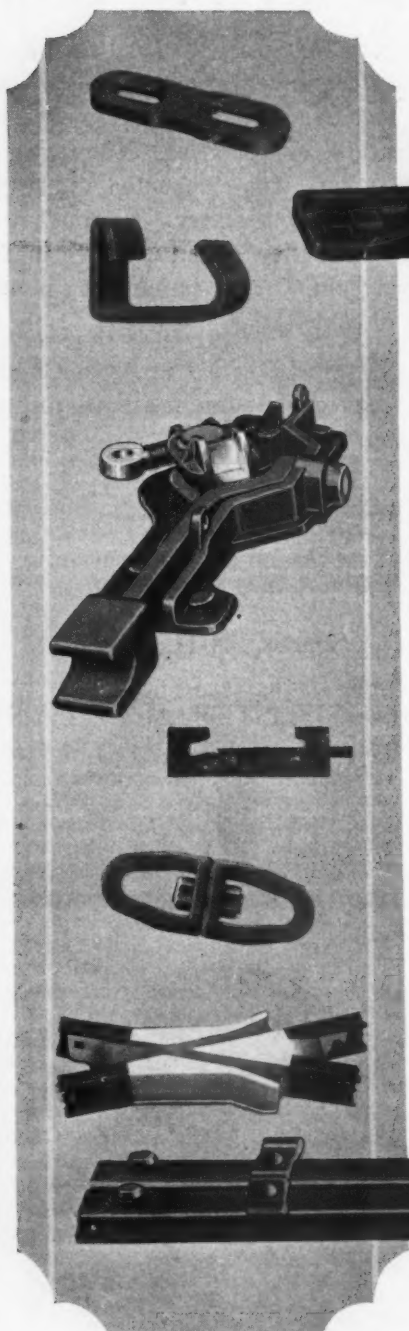


1856



ON DISPLAY AT CINCINNATI EXPOSITION

Booths
36-37



Model 75 Switch Stand (New)

You are cordially invited to visit the Bethlehem display at the National Exposition of Coal Mining Equipment of the American Mining Congress at Cincinnati, May 16-20. We will welcome the opportunity to demonstrate the construction and explain the qualities and economies of Bethlehem Mine and Industrial Track Equipment.

Bethlehem
Mine and Industrial
Track Specialites

Steel Mine Ties
Light Rails
Splice Bars
Bolts and Nuts

Switches
Switch Stands
Alloy Steels
Tool Steels
Mine Car Sprags

Coupling Pins and Links
Grimm Rail Clamps
Industrial and Mine Cars

New 160-page book on Bethlehem Mine and Industrial Track Equipment containing data, tables and calculations to users of light rail equipment, will gladly be sent upon request.



Bethlehem Standard Mine Tie

BETHLEHEM STEEL COMPANY
General Offices: **BETHLEHEM, PA.**

DISTRICT OFFICES:

New York Boston Philadelphia Baltimore Washington Atlanta
Pittsburgh Buffalo Cleveland Detroit Cincinnati Chicago
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Bethlehem Steel Export Corporation, 25 Broadway, New York City.
Sole Exporter of Our Commercial Products.

From top to bottom: Reinforced Coupling Link—Grimm Rail Clamp—Model 1217 Switch Stand—Bethco Rail Anchor—Swivel Coupling Link—Solid Manganese Steel Frog, Design 289.

BETHLEHEM

ROCK DUSTING?

Reasons for using

The **Legrabon**

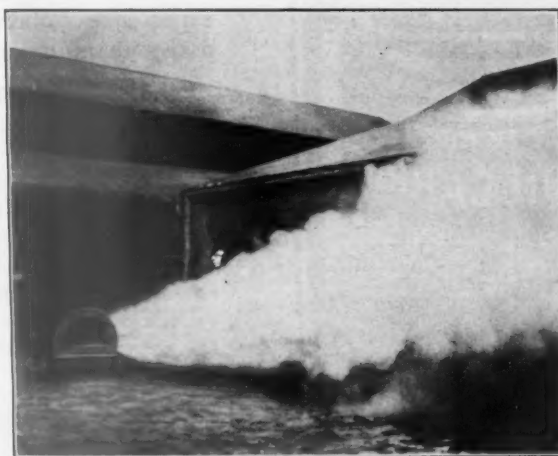


- 1 Speed
- 2 Effectiveness
- 3 The Operator is
away from the dust

Ask us for details

**Diamond Machine
Company**

Monongahela, Pa.



Sales Agents

Cooke-Wilson Electric Supply Co.

Pittsburgh, Pa.

Charleston, W. Va.

That name UNION CARBIDE



THE family tree of Union Carbide dates back to the beginning of acetylene gas. It started with the first commercial production in 1892.

This means that in every drum of Union Carbide there is packed the results of thirty-five years of experience. It means that uniformity and high gas yield are integral qualities of the product.

Union Carbide is backed by the technical experience of chemists and engineers skilled for many years in carbide manufacture.

The familiar blue and gray drum bearing the name Union Carbide is a symbol of this integrity.

UNION CARBIDE SALES COMPANY

Unit of Union Carbide and Carbon Corporation

Carbide & Carbon Building, 30 East 42d St., New York City

PEOPLES GAS BUILDING
CHICAGO, ILL.



BALFOUR BUILDING
SAN FRANCISCO, CAL.

Union Carbide Warehouses in 190 Cities



Union Carbide Sales Company's Warehouses

Shipments always made on day orders are received

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| ARIZONA | | MASSACHUSETTS | | West Tulsa | 1402 W. 17th St. |
| Phoenix | 42 S. Central Ave. | Cambridge | 539 Concord Ave. | OREGON | |
| ARKANSAS | | Indian Orchard | Pasco Road | Portland | 15th and Hoyt Sts. |
| Little Rock | 1400 E. 6th St. | Worcester | 242 Canterbury St. | PENNSYLVANIA | |
| CALIFORNIA | | MICHIGAN | | Allentown | 311 Gordon St. |
| Fresno | 932 H St. | Detroit | 5785 Hamilton Ave. | Beaver | 486 Third St. |
| Los Angeles | 639 Gibbon St. | Grand Rapids | 435-450 Ionia Ave., S. W. | DuBois | Weber and Franklin Sts. |
| Oakland | 21 Madison St. | Iron Mountain | 513 Stephenson Ave. | East Greensburg | Clark and George Sts. |
| Sacramento | 1717 Third St. | Iron River | 321 Carnegie Ave., P. O. Box 357 | Erie | 1502 Sassafras St. |
| San Diego | 301 Fourth St. | Ironwood | 232 W. Ayer St. | Harrisburg | 25 S. Tenth St. |
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| Stockton | 748 S. Union St. | Jackson | 518 S. Water St. | Johnstown | Messinger St. and B. & O. R. R. |
| Taft | 130 Center St. | Lansing | 617 E. Shiawassee St. | Philadelphia | Delaware Ave. and Brown St. |
| COLORADO | | Muskegon | 410-420 Morris Ave. | Phillipsburg | North Front St., P. O. Box 146 |
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| Grand Junction | 433 South Ave. | Sault Ste. Marie | | Pottsville | Railroad and Anderson Sts. |
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HOW MANY OF THESE QUESTIONS CAN YOU ANSWER CORRECTLY?

THE following questions pertaining to explosives or to industries in which explosives are used should afford some pleasure and instruction for those who follow the popular indoor sport of "Ask Me Another".

The answers* to these questions are published in the May, 1927 issue of The Explosives Engineer magazine.

Write us today for a free sample copy of The Explosives Engineer, and when it arrives see how many of your answers check with the ones given by the Editors.

QUESTIONS

1. (a) Who discovered nitroglycerin.
(b) Who invented nitroglycerin dynamite?
2. What blasting supplies should never be transported or stored with explosives?
3. What high explosive is a liquid?
4. (a) Who was the first director of the United States Bureau of Mines?
(b) Who is the present director?
5. What are the three ingredients of blasting powder?
6. Does safety fuse burn slower, at the normal rate, or faster when tightly tamped in a bore hole?
7. What electrical instrument is used for testing electric blasting caps and blasting circuits?
8. Name two of the three methods of blasting boulders. Name first the method that requires the least amount of explosive and the one which requires the most explosive, last.
9. What is the velocity of detonation of Cordeau-Bickford?
10. When, where and by whom was coal discovered in America?
11. What is the best connection for electric blasting caps when fired by a power circuit when ample current and voltage are available?
12. What type of explosive is the most water-resistant?
13. What is generally considered the best explosive ingredient for use in detonators?
14. How many pounds of black blasting powder in a standard keg?
15. Give the four conditions prescribed by the United States Bureau of Mines requisite for a Permissible explosive.
16. Name three types of high explosives commonly used for industrial purposes.
17. What magazine publishes a monthly digest of articles relating to drilling or blasting that have appeared in the technical press of the world?
18. What are the standard granulations in which black blasting powder can be obtained?
19. Name the secretaries of the following associations:
(a) American Mining Congress.
(b) American Institute of Mining and Metallurgical Engineers.
(c) American Zinc Institute.
(d) National Crushed Stone Association.
(e) Associated General Contractors.
(f) National Slate Association.
20. What great railroad tunnel has recently been holed through?
21. How should safety fuse be cut for insertion in a blasting cap?
22. Of what material should a tamping stick be made?
23. How should empty dynamite cases be disposed of?
24. What state consumes more explosives than any other state in the United States?
25. What explosive is referred to as "The New Aladdin's Lamp"?

THE EXPLOSIVES ENGINEER

934 KING STREET, WILMINGTON, DELAWARE

* Through the courtesy of The Mining Congress Journal the answers are also printed on page 388 of this magazine.



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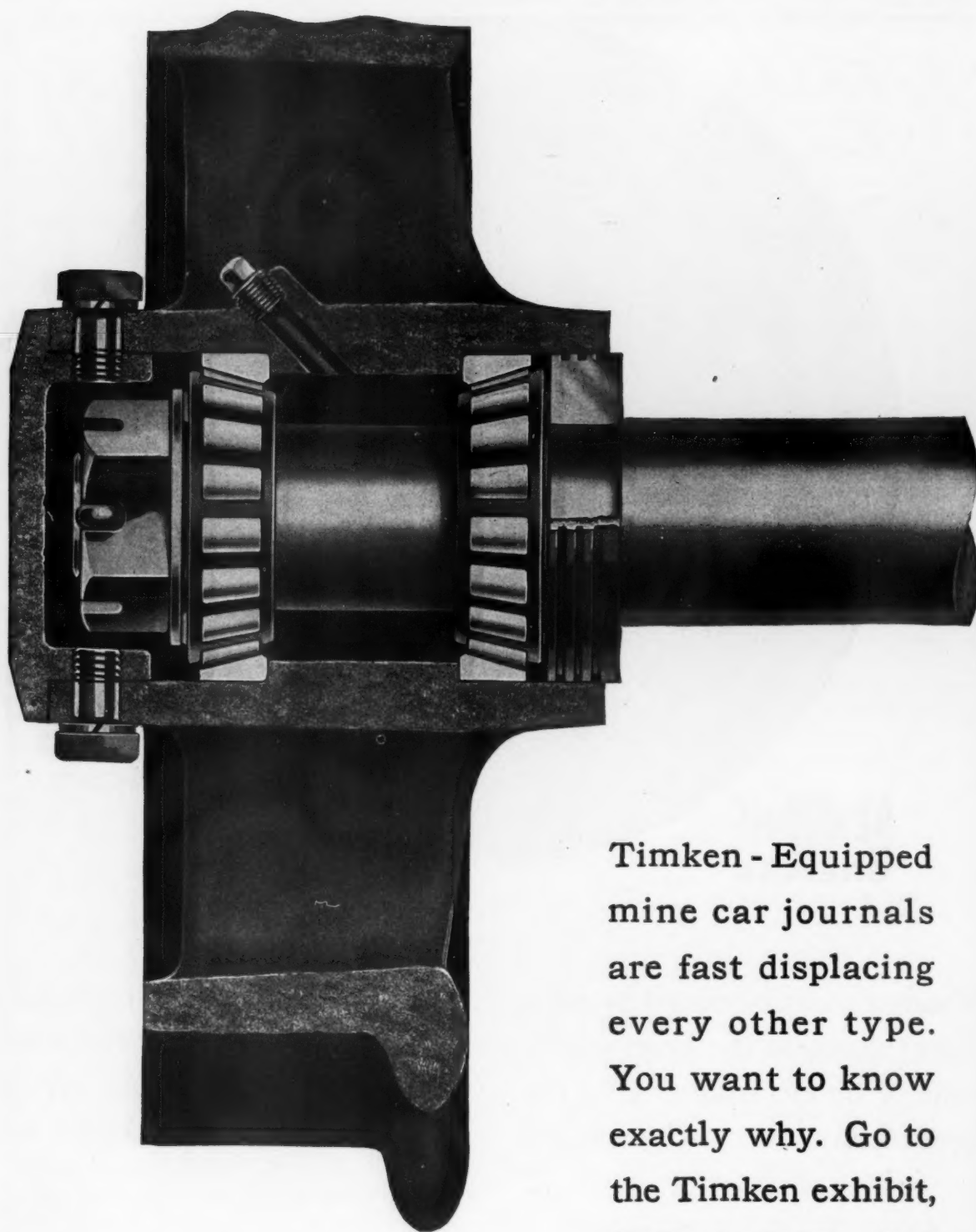


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A NEW ERA IN MINING is rising above the horizon. Its growth has been slow, and beset with many obstacles. But gradually a new science has been developing that means as much to the industrial progress and welfare of the nation as the development of hydro-electric power. We refer to the science of mechanical mining.

MECHANIZATION— THE DAWN OF A NEW ERA

Methods of mining are being revolutionized through the application of mechanical appliances made available through American inventive genius, and while the mechanical age as applied to the mining industry is still in its infancy, and has many hurdles to negotiate before it becomes of the national importance it is destined for, its growth is steady, sound and sure.

The American Mining Congress has been a pioneer in advocating mechanical production of minerals. It has worked steadily and untiringly for the past ten years in an effort to bring to the attention of the industry and the country the great advantages of such production. It has sponsored for four consecutive years the great conventions of practical operating men that have, in conjunction with the expositions of mine equipment, been held at Cincinnati.

The Fourth Convention will be held this month, during the week of May 16—at the same point, and the interest shown in this meeting is a clear indication of how seriously the industry is studying mechanical means of production. Each convention and exposition has shown marked progress over the preceding year, and the 1927 meeting is on a par with the meetings that have been held in previous years, showing marked improvement in character of exhibits, numerical attendance, and co-operative spirit.

It may be safely said that mechanical mining has now passed the experimental stage. It is here to stay, to grow and to prosper. Mr. Southward's preliminary report which appears in this issue shows conclusively that mechanical mining can both "tell" and "demonstrate" its efficiency. It is true that the number of operations that are using mechanized mining are small in comparison with the total number of mines using hand loading. But it is an interesting fact that those companies that have adopted this means of production are adding units, and increasing their output. There are a considerable number that may be termed as "100 percent mechanical," and many that are working full time in direct competition with adjacent hand-loading mines. Investigation has also proved that mechanical mining is being conducted successfully under a variety of conditions, and is not confined, as has been popularly supposed, to "six feet of clean coal with good top." In fact it is equally successful in seams that have as high as 40 percent impurities and range from 30 inches to nine feet in thickness.

Three sessions of the Cincinnati convention will discuss Mechanical Loading, and three sessions will discuss Coal Preparation, two of the biggest factors in mechanical mining. The Safety session is of outstanding importance, as is the closing session, which is intimately woven into the whole, on Cutting and Blasting.

Not a subject is scheduled for discussion that is not of vast importance and genuine interest to the man charged with responsibility of getting the coal out of the ground—every coal man from president of the company, down to the foreman will find the program of distinct interest.

These conventions have for their purpose continuous growth of the industry. They proceed on the premise that every improvement that may be brought about in the various mines as the result of these discussions and the interchange of ideas and information, means improved conditions in the mines, more satisfactory fuel, better service to the customer, in fact, a healthy, growing industry.

Such a program merits the praise of the public, the confidence of the mine workers, and the financial success of those engaged in coal production.

"THE REAL TAX PROBLEM of the country is no longer in Washington, but in the State Capitols, and in the city halls and county seats throughout the country." That is the statement of Ogden L. Mills, Assistant Secretary of the Treasury. It is confirmed in a report recently published by the Joint Congressional Committee on Internal Revenue Taxation, in which comparisons are made that strikingly portray the rapid increase in the tax burden from state and local taxation as against the downward trend in Federal taxation. Therefore, Mr. Mills admonishes taxpayers to "turn your eyes homeward. Much remains to be done there."

THE TAXPAYER'S RESPONSIBILITY

It may be safely said that mechanical mining has now passed the experimental stage. It is here to stay, to grow and to prosper. Mr. Southward's preliminary report which appears in this issue shows conclusively that mechanical mining can both "tell" and "demonstrate" its efficiency. It is true that the number of operations that are using mechanized mining are small in comparison with the total number of mines using hand loading. But it is an interesting fact that those companies that have adopted this means of production are adding units, and increasing their output. There are a considerable number that may be termed as "100 percent mechanical," and many that are working full time in direct competition with adjacent hand-loading mines. Investigation has also proved that mechanical mining is being conducted successfully under a variety of conditions, and is not confined, as has been popularly supposed, to "six feet of clean coal with good top." In fact it is equally successful in seams that have as high as 40 percent impurities and range from 30 inches to nine feet in thickness.

Taxpayers appear to have been surprisingly complacent with respect to state and local bond issues, taxes and expenditures. An enormous debt-incurring, tax-increasing, money-spending program has been in progress throughout the nation. Bond issues have been approved without being subjected to critical, business-like analyses to ascertain whether or not they could be paid down. All sorts of public projects have been undertaken with the tacit approval of the taxpayers without any sort of check or supervision on their part to insure wise expenditures of the public funds.

In so far as the Federal or national debt is concerned, there is little or no cause for worry. For several years it has been reduced at the rate of about one billion dollars annually, and future annual reductions

will not fall far short of this rate, unless Congress interferes with the policy of rapid reduction which otherwise will doubtless continue as a Treasury policy under future administrations, for whom the present administration has established a most creditable example to be followed.

But the state and local situation is not developing under such wise or positive control. According to Professor Robert Murray Haig, in the March issue of the *World's Work*, "Most serious students of the problem agree that in the absence of economic or political disintegration or retrogression, the outlook is for an enlargement rather than a concentration of governmental activity and of its cost. The number and importance of the things which we shall find it desirable to do collectively and under public auspices is likely to increase. We shall probably want more and better education, more and better transportation facilities, and more and better services in general. This will necessitate more and better taxes."

As we have pointed out heretofore, two solutions are available—first, control by well-organized state associations of taxpayers; second, control by a state governmental agency. The first solution has proved satisfactory and very effective in the few states where it has been tried out. It conforms to the principles of self-government. Under it the taxpayers assume direct responsibility for the borrowing and spending projects that are approved and carried on. The second solution will afford many safeguards against excessive bond issues and unwise expenditures, but leaves the way open to arbitrary decisions and political and geographical discriminations. However, one plan or the other should be adopted without delay in every state, as the upward tendency of governmental costs must be curbed and kept under positive control. The taxpayers of the country have the power to keep future commitments for debt and taxation within sound and reasonable limits. They should exercise that power.

AND STILL THEY COME! Sentimentalists and sob-sisters, playwrights and authors, and now the "economists," to tell us what we

THEY FOOL ONLY THEMSELVES

must do to save Europe. Not merely must we revise the debt settlement and the Dawes plan, not merely must we continue to lend them money and extend them credit, but we must, so they say, break down our protective tariff, lessen our production, reduce the American workingman's wages and purchase five times as much pauper-made goods, to evidence "real cooperation" in the rehabilitation of Europe.

The latest of these propagandists to titillate our risibilities is Sir George Paish, British publisher and economist (*sic*), who according to recent interviews, says that what England needs today, to survive her present crisis, is to "sell goods in tremendously larger amounts" in this country. He proposes that this emergency treatment shall be accorded world sanction at the economic conference to be held at Geneva.

Not fervently does he ask "What must we do to be saved," nor yet prayerfully "Come over into Macedonia and help us," but boldly, and as one speaking with authority, he propounds that age-old socialist doctrine that wealth, prosperity, efficiency, the rewards of initiative and business acumen, coupled with the possession of a major portion of the world's natural resources,

must all be sacrificed that Europe may be spared putting her own house in order; the old threadbare theory that the product of one man's brain, or one nation's sound economic policies, must be distributed to those whose political inaptitude or communistic tendencies have rendered them morally bankrupt; all may be likened to the agitator who would destroy that which he can not create.

America's world leadership today is not the result of demagogic propaganda, or secret alliances. Her prosperity is the fruit of intelligent power development, with skilled direction and mass production, paying the highest wages in the world, her workmen enjoying a higher standard of living than ever before.

If we are content to revert to idle factories and useless power lines, standing railroad cars and unemployed labor, markets overflowing with pauper-made products from abroad, and the American consumer without the earnings necessary for their purchase, and general stagnation of industry, let us by all means, accept Sir George's dictum, and open wide the gates not only to goods but to the unemployed and vagrant hordes who seek our shores. Then indeed, we shall all perish together!

Fortunately for this country, a determination to maintain economic as well as political independence among the nations of the world is engrained in the hearts of our people. This is why the United States is not a member of the League of Nations. Those who would yield to or be deceived by the doctrines of internationalism will be comparatively few in number. Their influence will carry little or no weight, and this country will continue to progress and prosper despite them. This British economist may continue to offer us his brand of economic salvation, and internationalists their fallacious doctrines. They merely serve to emphasize how well off we are without them.

A NEW ISSUE has been raised by the State of Alabama in respect to the relation of Federal and state

THE STATE'S RIGHTS IN MUSCLE SHOALS

ownership rights at Muscle Shoals. It is contended on behalf of the State of Alabama that "the State recognized every legal and equitable right of the national government in and to its investment at Muscle Shoals for both navigation and war purposes, but should the government depart from the manufacture of war munitions and seek to operate the power plant for the manufacture of electric power for commercial purposes or to lease the property for the primary purpose of profit, the State must require such terms or revenues for the State as may be determined to be just."

The Department of Justice is studying the legal phase of the problem and the Attorney-General has been asked for an opinion. It is unlikely that the Attorney-General will agree with the contention of the State of Alabama that it is owner of all rights at Muscle Shoals, subrogated only as to Federal use for navigation and national defense. This question, however, affects not only the State of Alabama in relation to the development and use of Muscle Shoals, but it is involved in the disposition and use of public lands in all of the western states. If Muscle Shoals is developed and operated by the Federal government, it undoubtedly would be held exempt from state taxation, and the State would lose vast taxation revenues as the result, just as the western states are losing large taxation revenues through the op-

eration of the Federal leasing system and the policy of the Federal government to withhold vast areas of the public domain from private ownership and development.

As we have pointed out heretofore, the policy of the Federal government in relation to the disposition of public lands in the western states should be no different from that which prevailed while the central states and middle western states were being developed, and where practically all of the original public domain has passed to private ownership and is now subject to state and local taxation. There is no reason why the western states should be discriminated against in this matter. There is no reason or justice in the present policy of the Federal government to extend the leasing system and thus prevent public lands from passing to private ownership. The continuation of this policy logically will have the effect of restricting the growth of the population in our western states and the development of their great natural as well as their agricultural resources.

Unless the representatives in Congress from the western and southern states cooperate in demanding a change of policy on the part of the Federal government with respect to the disposition of public lands and the development of natural resources and hydro-electric power on the public domain, it is believed that one measure will follow another to provide for the extension of Federal authority perhaps to the point of Federal ownership and operation in competition with private enterprise, which is the backbone of American industry and prosperity. Not only must the Muscle Shoals question be settled satisfactorily in the interest of the State of Alabama, but the general question of state rights in the public domain must be determined at an early date in the interest of the western states as well as the whole country.

IN NO RECENT CASE involving union domination of labor has there appeared more glaring misuse of power and control over union employees than is shown by the facts set forth in the decision of the United States Supreme Court in the case of the *Bedford Cut Stone Company vs. Journeymen Stone Cutters' Association of North America*.

MODERN SERFDOM

The General Union had an alleged grievance against the Bedford stone producers, who were operating under agreements with unaffiliated unions, with the effect of closing their shops and quarries against the members of the General Union and its locals. It therefore issued an order to all its locals and members, directing its members not to work on stone "that has been started—planed, turned, cut, or semi-finished—by men working in opposition to our organization." The effect of the order was intended to be two-fold, first, to prevent the use of the Bedford Company's stone; second, to compel the employees of that company to affiliate with the Union. The order was to be promptly enforced in every part of the country. And that meant that thousands of men employed by local builders would be thrown out of employment—although there was no disagreement or feeling whatever between the Union and the local builders. The intention of the Union officials was to injure the Bedford stone producers through local employers who were purchasers and users of the Bedford product. To quote from the Supreme Court's decision:

"The evidence makes plain that neither the General Union nor the locals had any grievance against

any of the builders—local purchasers of the stone or any other local grievance and that the strikes were ordered and conducted for the sole purpose of preventing the use and consequently the sale and shipment in interstate commerce of the shippers product, in order, by threatening the loss or serious curtailment of their interstate market to force petitioners to the alternative of coming to undesired terms with members of these unions."

The court held that the present combination deliberately adopted a course of conduct which directly and substantially curtailed, or threatened thus to curtail, the natural flow in interstate commerce of a very large proportion of the building limestone production of the entire country to the gravely probable disadvantage of producers, purchasers and the public; and it must be held to be a combination in undue and unreasonable restraint of such commerce within the meaning of the Anti-Trust Act.

The court laid down this rule that "An act which lawfully might be done by one man, when done by many acting in concert, take on the form of a conspiracy and become a public wrong and may be prohibited if the result be harmful to the public or to individuals against whom such concerted action is directed." In other words, while it is the right of any individual to refuse to work whenever he may see fit, when a group of individuals attempts to exercise this right in concert, and resorts to practices which unduly restrain competition or unduly obstruct the free flow of interstate commerce, we believe the Supreme Court is correct in holding that individual rights, so-called, must yield to the national authority. It is entirely just that the Anti-Trust Act should be strictly enforced against combinations of employees that adopt unlawful means to accomplish their objects as well as against combinations of employers who violate its provisions.

It is hoped that this decision of the Supreme Court will have the effect of discouraging labor organizations from adopting unlawful practices to compel acquiescence and obedience to the plans they initiate for imposing their demands upon employers in industry, or upon employees of any enterprise who refuse to join such organizations. Modern employees ordinarily are not serfs in any sense of the term as long as they are free to exercise their individual judgment in accepting or refusing employment; but if labor organizations are permitted to compel union affiliation and obedience to union dictation, their industrial status differs but little from that of the serfdom of the Middle Ages.

PRESIDENT COOLIDGE, in an address to the United Press Association, outlined this government's foreign policy, particularly with respect to the protection of American lives and property; and made it clear that confiscation of property of American citizens would not be tolerated. The President stated that it is a cardinal principle of law that private property should not be taken without fair compensation; that Mexico appears to be threatening to disregard this great elementary principle; that arbitration has been suggested, and everybody favors arbitration when the question at issue is arbitrable, but under the present circumstances he sees grave difficulties in formulating a question which the two governments would agree to submit to such a tribunal.

A SOUND FOREIGN POLICY

In other words, the President does not believe this country should permit any other country to take the lives or property of citizens of the United States, or even permit any country to argue the question before a tribunal for arbitration. Furthermore, the duty of this government to protect the lives and rights of citizens is not open to question. Thus, it appears that the peace-at-any-price propagandists, and the "leave the United States at your own risk" advocates, are not gaining any headway with the present administration.

The President made a very significant observation with respect to American investments abroad. He said that "our country consumes vast quantities of oil and gasoline in its use in automobiles, gas engines, and oil-burning furnaces. If these products are to be kept within a reasonable price, which is very important to a great body of our citizens, our people who go abroad to develop new fields and to increase the supply ought to have the encouragement and support of our government." Is not this the answer to much of the jingoism that fills the radical press and even colors the editorial matter in many of the conservative journals and newspapers? It is just as important to the laborer or farmer as to the wealthy industrialist, that American enterprise in foreign oil fields, as well as in other lines, shall be maintained and safeguarded.

WE HAVE BEFORE CALLED ATTENTION to a fallacy which is being overworked by free trade advocates

**AN OVERWORKED
FREE TRADE
FALLACY**

whose direct opposition to a compensatory tariff has been demolished and who now seek a new line of attack and assert that we must open our protected markets to the products of cheap labor abroad in order to make possible the collection of our loans to foreigners and to foreign countries.

Among the more distinguished of these advocates is Mr. W. L. Clause, chairman of the Board of the Pittsburgh Plate Glass Company. In an article in *Nations Business* of April, 1927, under the title "Loans a Menace to the Tariff," Mr. Clause says:

"This country is just beginning to wake up to the fact that the payment by foreign countries of the loans we have been making, as well as what is due us from our allies on account of the loans we made them during the war, are in the last analysis related to our own industrial problems and to the question of our protective tariff. Payments can only be made in goods and sales of goods in volume sufficient to discharge the interest, and principal payments on such obligations, can not be made unless our tariff is removed or, at any rate, lowered to a sufficient extent to enable the foreigners to make such sale."

It is asserted by statisticians that the wealth produced in the United States during 1926 was eighty billion dollars. Approximately 90 percent of this production was consumed at home by prosperous citizens each of whom earned enough to buy his share and still have a surplus to spend for foreign made goods. Five billions of this surplus could have been and in 1926 was used to buy back from foreign countries goods equal in value to our exports; and the balance of earned surplus, probably ten or fifteen billions, was available to buy additional imports to an extent which would enable foreign nations to pay their obligations.

If these figures are even approximately correct it seems plain that so long as our domestic markets absorb 90 percent of our production that our industrial conditions are secure—and at the same time we may hope for a full return on our foreign investments.

Mr. Clause points to Great Britain as an example of what happens to a country which loans its money to competing nations instead of spending it on her industries at home in research and modern engineering to keep them up to date.

If Mr. Clause will examine the position of Great Britain a little more carefully, he will discover that the trouble with British industry is not a lack of proper equipment, but a domination by labor unions who were able before the war to bring England to the edge of industrial bankruptcy by inefficiency which lost to the British Empire her domination of world markets and forced British capital into foreign investments. A step farther will disclose the fact that these foreign investments at the beginning of the World War were the salvation of Britain and her principal resource after her home industrial life had been sapped by the monopoly of labor union domination.

Incidentally it may be stated that the life of a monopoly is short and that labor monopoly, whether in England or Illinois, while it may flourish for a time, will sooner or later destroy itself and drag down with it the industry upon which it depends.

Foreign investments of capital not needed in our home industries will provide the means by which the financial supremacy of this country shall be maintained so long as those loans are allowed to stand and there is little doubt that interest and principal will eventually be paid.

On the whole Mr. Clause's article is ably written and except for his acceptance of the usually accepted fallacy that the maintenance of a compensatory tariff which will maintain our industrial prosperity and the solvency of our creditor nations at the same time is impossible.

Mr. Clause says:

"I have no doubt the bankers who are floating these foreign loans believe they will bring about a change in tariff sentiment upon the theory that when the loans have been absorbed and widely scattered over the country, the holders of the bonds will ultimately learn that the only hope of getting their money back lies in a reduction of our tariffs."

This supposed danger is entirely obviated by the fact that the value of domestic loans of infinitely greater amount would be jeopardized by such action. It is most unfortunate that this fallacy should be presented through the official publication of the Chamber of Commerce of the United States.

It must be remembered that the nations of the world with whom we do business are many and our creditor nations few; that all of these nations are potential purchasers of goods either our own or the product of these same creditor nations; that these creditor nations may make a profit on their sales to many other countries with which they may pay their obligations to us and more important still that rather than destroy our own prosperity we had better allow these loans to remain unpaid. Our own supremacy is established and in spite of abject labor elsewhere our domination of such world markets as we care to reach may be held by mass production made possible by a protected domestic market which absorbs the major part of domestic production.

FOURTH ANNUAL MEETING PRACTICAL COAL OPERATING MEN

Convention Again Called For Cincinnati—Coal Preparation, Mechanical Loading, Safety, And Blasting Problems To Be Discussed By Operators Who Are Solving Them—Exhibits Unusually Interesting And Important

SIXTY coal operators, representing every coal producing district in the United States, under the leadership of Mr. Ezra Van Horn, general manager, Clarkson Coal Co., Cleveland, Ohio, comprise the Program Committee for the Fourth Annual Convention of Practical Coal Operating Men, to be held at Cincinnati, Ohio, May 16 to 20. The committee has devoted a great deal of time during the past three months to the development of a program that would truly meet the need of the industry at this time. That it has been successful is evidenced by the program itself, which appears in this issue of the JOURNAL.

The committee is composed of the following individuals and associations:

Ezra Van Horn, *chairman*; Hugh Shirkie, The American Mining Con-

gress; Scott Turner, the United States Bureau of Mines; S. A. Taylor, The American Institute of M. & M. Engineers; Walter Barnum, the National Coal Association; J. J. Rutledge, the Coal Mining Institute of America; E. W. Parker, Anthracite Bureau of Information; C. H. Mead, Winding Gulf Oper.

PENNSYLVANIA MEMBERS OF THE PROGRAM COMMITTEE



Ezra Van Horn, Chairman, Program Committee



G. F. Osler



J. B. Warriner



L. E. Young



A. W. Hesse



E. J. Newbaker



Newell G. Alford



A. B. Kelley



F. G. Wilcox



E. P. Lucas, Washington



N. D. Moore, Washington



F. V. H. Collins, Montana

Assn.; C. J. Neekamp, Northeast Kentucky Coal Assn.; E. J. McVann, Smokeless Coal Oper. Assn.; C. E. McLaughlin, Coal Oper. Assn. of Illinois; D. C. Kennedy, Kanawha Coal Oper. Assn.; P. H. Penna, Indiana Bit. Coal Oper. Assn.; W. E. E. Koepfer, Pocahontas Oper. Assn.; W. L. Johnson, S. W. Interstate Coal Oper. Assn.

Alabama: F. S. Follansbee, Woodward Iron Co.; Frank G. Morris, Republic Iron & Steel Co.; James Nicol, Jr., Gallo-way Coal Co.

Colorado: J. B. Marks, Colorado Fuel & Iron Co.; Geo. T. Peart, Rocky Mountain Fuel Co.

Illinois: George B. Harrington, C. W. & F. Coal Co.; G. C. McFadden, Peabody Coal Co.; J. D. Zook, O'Gara Coal Co.; G. E. Lyman, Madison Coal Corp.

Indiana: David Ingle, Ayshire Coal Co.; Carl J. Fletcher, Knox Coal Mining Co.; Morton Gould, Linton Coal Co.; P. L. Donie, Linton Coal Co.

Kansas-Missouri: John A. Sargent, Central Coal & Coke Co.; Frank Thomas, Clemens Coal Co.

Kentucky: Sterling S. Lanier, Jr., Norton Coal Co.; C. W. Taylor, W. G. Duncan Coal Co.; J. A. Helms, Fordson Coal Co.; F. J. O'Connell, Wisconsin Steel Co.; T. E. Jenkins, West Kentucky Coal Co.

Montana: J. F. Lobdell, Eagle Coal Co.; F. V. H. Collins, Bair-Collins Co.

New Mexico: W. D. Brennan, Stag Canon Fuel Co.; Frank A. Young, St. L., R. Mt. & P. C. Co.

Ohio: O. S. Newton, Sunday Creek Coal Co.; Ezra Van Horn, Clarkson Coal Co.

Pennsylvania: F. G. Wilcox, West End Coal Co.; Geo. F. Osler, Pittsburgh Ter-

WESTERN MEMBERS OF THE PROGRAM COMMITTEE



D. D. Muir, Jr., Utah

Warriner, Cranberry Creek Coal Co.; L. E. Young, Pittsburgh Coal Co.; F. R. Vinton, Rochester & Pittsburgh Coal Co.; Newell G. Alford, H. N. Eavenson & Associates; E. J. Newbaker, Berwind White Coal Co.

Tennessee: John L. Boyd, Proctor Coal Co.; W. B. Young, Tennessee Products Corp.

Utah: D. D. Muir, Jr., U. S. S. R. & M. Co.

Virginia: H. S. Estill, Stonega Coke & Coal Corp.; D. Terpstra, Premier Red Ash Coal Co.; J. D. Martin, Virginia Iron, C. & C. Co.; George Craft, Pocahontas Fuel Co.

Washington: N. D. Moore, Pacific Coast Coal Co.; E. P. Lucas, Bellingham Coal Mines.

West Virginia: Thos. DeVenny, Portsmouth By-Product C. Co.; Edward Graff, The New River Co.; A. R. Beisel, Island Creek Coal Co.

Wyoming: Eugene McAuliffe, Union Pacific Coal Co.; Gomer Reese, Kemmerer Coal Interests.

As an evidence of the growing interest in these conventions and expositions,

this committee is an outstanding example. In 1926 38 operators cooperated in arranging the program. This year double that number were invited to participate, and approximately 90 percent responded in the affirmative gladly and willingly contributing their time, their money, and their ability in this great cooperative effort for the benefit of one of the country's greatest industries. As a further evidence, the attitude of those responsible for mine management in sending their key men to these conventions has been very gratifying. Many companies are sending from 6 to 12 men, and have expressed themselves as thoroughly satisfied with the results they obtain through this cooperation.

The 1927 meeting promises to surpass other meetings. The inquiries for reduced fare certificates are greater than in previous years, as well as the demand for preliminary programs.

The committee before holding any meetings at all, sent out a questionnaire to the entire industry asking for suggestions concerning problems of the various districts. The replies indicated in no uncertain manner that what the industry wanted discussed was coal preparation, mechanical loading, safety, and blasting and cutting. The first meeting of the committee was held at the Washington headquarters of the American Mining Congress early in February, where the tentative program was arranged, and later, meetings were held in Pittsburgh, Chicago and Cincinnati, with the result that the program is one of outstanding importance, and one that will interest all mine operators, coming as it does from the very heart of the industry itself.

The convention will formally open on Monday evening, May 16, with the official opening of the National Exposition of Mine Equipment. The Manufacturers Division of The American Mining Congress will tender delegates an informal reception and dance. The Cincinnati Coal Exchange is cooperating in the arrangements for this reception, and delegates are assured a hearty welcome from Cincinnati coal men, as well as from the convention management. An address of welcome will be given by the Mayor of Cincinnati; a short response made by the President of The American Mining Congress. Mr. Ezra Van Horn, chairman of the Program Committee, will respond to the addresses of welcome, after which there will be dancing. The entire program will be carried on at Music Hall, where the exposition is staged. Dancing will be arranged for in the convention auditorium in South Hall, in a specially constructed room.

A special dinner dance has been arranged for Thursday evening, May 19,



Eugene McAuliffe, Wyoming



Geo. B. Harrington, Illinois



Morton Gould, Indiana



C. W. Taylor, Kentucky



O. S. Newton, Ohio



G. E. Lyman, Illinois



P. L. Donie, Indiana



J. A. Helms, Kentucky

CENTRAL STATES MEMBERS OF THE PROGRAM COMMITTEE

at the Sinton Hotel. Mr. Noah H. Swayne, nationally known humorist, will be a speaker, and Mr. Otis Mouser, president Stonega Coke and Coal Co., will give a short talk on the "Bituminous Coal Industry." This event will be decidedly informal, with plenty of music, dancing, and fun. The "speech making" will be limited to 60 minutes, and the



F. S. Follansbee, Alabama



W. B. Young, Tennessee

rest of the time between 7 and 12, will be given over to singing and dancing, and a genuinely happy evening.

The first session of the convention will open on Tues-

day morning, May 17, at 10 o'clock, when "Coal Preparation" will be under discussion. Mr. Howard N. Eavenson, of H. N. Eavenson & Associates, Pittsburgh, Pa., will preside, and the following phases of coal preparation will be discussed: "Recent Developments and Necessity for Coal Preparation"; "Effects of Coal Cleaning on its Marketability"; "Economic Methods of Eliminating Impurities in the Preparation of both Anthracite and Bitumi-



H. S. Estill, Virginia



Thomas DeVenney, West Virginia

nous Coal"; "Preparation of Bituminous Coal by Sand Flotation Process," and "Cleaning Coal at Phelps Dodge Corporation's Coal Properties."

Harry S. Gay, general superintendent, Gay Coal & Coke Co., Mt. Gay, W. Va., will preside at the second session of the convention, Tuesday afternoon, May 17, when the discussion of "Coal Preparation" will be continued, the following phases being under consideration: "Cleaning Coal at the Colonial Breaker of Madeira Hill & Co."; "Commercial Preparation of Anthracite by Sand Flotation System"; "Cleaning Small Size Anthracite and Bituminous Coals"; "Cleaning Coal by the Launder System"; "Air Cleaning at Montour No. 10 Mine, Pittsburgh Coal Co."

SOUTHERN MEMBERS OF THE PROGRAM COMMITTEE

Coal preparation discussion opens the third session, on Wednesday morning, May 18, with Mr. J. D. Zook, vice-president and general manager, O'Gara Coal Co., Chicago, presiding. The following phases of the subject will be discussed: "Dry Cleaning of Coal at the Berwind White Operations"; "Cleaning West Virginia Coal"; "Cleaning Coal and Results Obtained at Algoma Coal and Coke Co."; "Preparing Coal by Table Washing Method"; "Preparation and Marketing Crop Line and Off Grade Coals"; "Cleaning Coal By the Wet Jig Process." This will conclude the discussions of coal preparation per se.

The Wednesday afternoon session inaugurates the first of three sessions at which "Mechanical Loading of Coal" will be discussed. Dr. L. E. Young, vice-president, Pittsburgh Coal Co., and chairman of the Mining and Loading Section, National Standardization Division, The American Mining Congress, will preside at this session, when the following phases of the subject will be discussed: "Recent Developments in Mechanical Loading"; "Four Related Factors in Mechanical Mining"; "Developments in Cutting, Shearing and Snubbing with Mechanical Loading"; "To What Extent Does Roof Control Effect Mechanical Loading"; "Is Mechanical Mining Dependent Upon Roof Control," and "How Preparation Has Increased Use of Loaders in Coal Seams With Dirt Bands."

A. W. Dickinson, general superintendent, Union Pacific Coal Co., Rock Springs, Wyo., is chairman for the Thursday morning session, May 19, which is a continuance of the Mechanical Loading program. The following phases will be taken up: "Conveyor System Applied to Longwall Mining"; "Conveyors Applied to Room and Pillar Mining"; "Scraper Loaders Applied to Modified Longwall Mining"; "Complete Recovery by Mechanical Mining"; "Mining in Wyoming by Mechanical Loading Exclusively"; "Loading by Mechanical Methods Exclusively."

At the final session of the Mechanical Loading program, Thursday afternoon, May 19, T. E. Jenkins, vice-president, West Kentucky Coal Co., Sturgis, Ky., will preside, with special discussion on the following phases: "Entry Driving with Mechanical Loaders"; "Panel Development With Mechanical Loaders for Retreating Methods"; "Mechanical Loading Under Draw Slate and Bad Roof"; "Shaking Conveyors on Pillar Recovery."

"Safety in Coal Production" will occupy the attention of the Friday morning session, May 20, when W. L. Robison, Youghiogheny & Ohio Coal Co., Cleveland, Ohio, will preside. This is one of the most important sessions of the convention, and considerable interest has attended its development. The first



Wm. H. Lindsey, President of The American Mining Congress

subject to be presented will be "Shall There be Developed a National Safety Code." This subject will not be thrown open for discussion at this session.

"Safety Features in Mechanical Mining" will be the first of the operating subjects presented, and will be followed by "Best Means to Keep Accident Prevention Before Men"; "Improving Mine Safety Through Conference on Improved Foremanship"; "When and How to Unseal Mine Fires," and "Handling Gases Through Proper Ventilation."

Mr. Erskine Ramsay, consulting engi-

neer, Alabama By-Products Corporation, will preside at the final session of the convention, which will discuss "Cutting and Blasting Problems," the following phases of that subject being under consideration: "Under What Conditions Should Top and Bottom Cutters Be Used"; "Reducing Blasting Costs Through Supervision"; "Preparation and Blasting for Mechanical Loaders," and "How Blasting Efficiency Increases Production."

This is an exceptionally well balanced and interesting program. Every operating man attending the meeting is sure to return home with a vast amount of information that may be applied to his own production problems. The proceedings will appear in THE MINING CONGRESS JOURNAL in full, and will afterwards be reprinted in pamphlet form.

The importance of these conventions has been demonstrated over a period of four years, the present meeting being the fourth consecutive convention arranged by The American Mining Congress, under the direct supervision of its Manufacturers Division.

While the coal industry is mechanically in advance of the times, and is the subject of international wonder from a production standpoint, it has not in any sense lessened its efforts toward improvement. Perhaps in no other industry is cooperation more complete than it is among coal producers in trying to solve their operating problems. This is evidenced by the willingness of management to send their men to these Cincinnati meetings, not alone to sit and listen to the papers prepared by other operators, but to participate in the discussions, to tell other operators just what they are doing, and how and why, plus the results they are obtaining.

Of major interest to the convention will be the report of Mr. G. B. Southward, Mechanization Engineer, of The American Mining Congress, who for the past five months has visited a large number of bituminous and anthracite operators where they are using some form of mechanical loading. Mr. Southward will tell the convention in a short summary, what he has accomplished to date, and what The American Mining Congress hopes to accomplish through this investigation. His paper as indicated above will be followed by papers on specific operations where mechanical loading is proving successful under varying conditions.

The program for "Safety Work" is of more than ordinary importance. One of the main features of that session is "How to Unseal Mine Fires." At the 1926 convention the question of "Sealing Mine Fires" was discussed, and the committee decided to reverse the subject this year, and discuss unsealing. The subject will be presented by men who have

Other Members of the Program Committee whose portraits were unavailable:

Frank G. Morris and James Nicol, Jr., Alabama.

J. B. Marks and George T. Peart, Colorado.

G. C. McFadden and J. D. Zook, Illinois.

David Ingle and Carl J. Fletcher, Indiana.

John A. Sargent, Missouri.

Frank Thomas, Kansas.

Sterling S. Lanier, Jr., F. J. O'Connell, and T. E. Jenkins, Kentucky.

J. F. Lobdell, Montana.

W. D. Brennan and Frank A. Young, New Mexico.

F. R. Vinton, Pennsylvania.

John L. Boyd, Tennessee.

D. Terpstra, J. D. Martin, and George Craft, Virginia.

Edward Graff and A. R. Beisel, West Virginia.

Gomer Reese, Wyoming.



H. K. Porter, Chairman

OFFICERS OF THE MANUFACTURERS DIVISION OF THE AMERICAN MINING CONGRESS

given serious thought and study to this problem, and is divided into three major sections. It will also be discussed from the viewpoint of the operator, and that of the state mine inspector. While the question of a national safety code will come up briefly at this session, it will not be discussed fully until Saturday, May 21, at a special conference called for the purpose of determining the feasibility, the desirability and the necessity for a national code on this subject.

The problems of the coal producer are indeed abundant, but there is a determined effort to solve them, an effort that has grown from year to year, with an amazing growth, a steadily increasing interest, and a still greater effort toward results.

The exposition will be representative in every sense. One hundred and eleven companies will have exhibits. Everything looking to complete mechanization of the mine will be demonstrated. Manufacturers representatives will sit in with the discussions. They will gladly cooperate in every manner in giving the fullest information concerning their equipment.

The following firms will display their equipment:

OFFICIAL LIST OF EXHIBITORS

Ahlberg Bearing Co., Allen & Garcia Co., Allis-Chalmers Co., American Car & Foundry Co., American Cast Iron Pipe Co., American Coal Cleaning Corp., American Mine Door Co., American



H. A. Buzby



C. L. Herbater



F. J. Maple



J. C. Wilson



N. S. Greensfelder

Rheolaveur Corp., American Steel & Wire Co., Ames Shovel & Tool Co., Atlas Powder Co., Automatic Reclosing Circuit Breaker Co.

Bethlehem Steel Co., Boxill-Bruel Carbon Co., Brown Fayro Co., Burton Publishing Co.

Carnegie Steel Co., Chance Coal Cleaning Co., Chicago Pneumatic Tool Co., Cincinnati Steel Castings Co., Coal Mine Equipment Co., Coloder Co., Concordia Electric Co., Conveyor Sales Co., Cutler Hammer Mfg. Co.

Deister Concentrator Co., Dravo Doyle Co., The Deming Co., Duff Manufacturing Co.

Eagle Iron Works, Edison Storage Battery Co., E. I. duPont de Nemours & Co., Electric Ry. Equipment Co., Electric Ry. Improvement Co., Electric Storage Battery Co., Enterprise Wheel & Car Corp., Eureka Copper Products Corp.

Fairbanks Morse & Co., Fort Pitt Mine Equipment Co., Frederick Iron & Steel Co., General Electric Co., Goodman Manufacturing Co., Grasselli Powder Co., Heisler Locomotive Co., Hendrick Mfg. Co., Hercules Powder Co., Hockensmith Wheel & Mine Car Co., Hulburt Oil & Grease Co., Hyatt Roller Bearing Co., Hydrotator Co.

Ironton Engine Co., Jeffrey Mfg. Co.,

Joy Manufacturing Co., Joyce-Cridland Co., Keystone Lubricating Co., Edw. C. Kirk & Sons, Koehler Manufacturing Co.

LaBour Co., Laughlin Filter Corp., A. Leschen & Sons Rope Co., Lincoln Steel & Forge Co., Link-Belt Co., Lorain Steel Co.

Mancha Storage Battery Locomotive Co., C. H. McCullough Engr. Co., McGraw Hill Catalog & Directory Co. (Key Div.), Martindale Electric Co., Mine Safety Appli-

ances Co., The Mining Congress Journal, Mining Safety Device Co., Morgan Gardner Electric Co., Morrow Mfg. Co., Mosebach Electric Co., Murray Pump & Valve Mfg. Co., Myers-Whaley Co., Inc.

National Carbon Co., R. D. Nuttall Co., Ohio Brass Co., Osborne Register Co., Penn Machine Co., Princeton Foundry & Supply Co., Phillips Mine and Mill Supply Co., Post Glover Electric Co.

Reed-Prentice Corp., Roberts & Schaefer Co., Robinson Ventilating Co., John A. Roebling's Sons Co., Rome Wire Co., Sanford-Day Iron Works, Simons Paint Spray Brush Co., Simplex Wire & Cable Co., S. K. F. Industries, Streeter-Amet Weighing & Recording Co., Sullivan Machinery Co.

Taylor Wharton Iron and Steel Co., Templeton, Kenly & Co., Ltd., Timken Roller Bearing Co., Tool Steel Gear & Pinion Co., Bertrand P. Tracy Co., Traylor Vibrator Co., Troco Lubricating Co., The W. S. Tyler Co.

Una Welding & Bonding Co., Union Carbide Co., United States Bureau of Mines, Watt Car & Wheel Co., Waverly Oil Works Co., Weinman Pump Mfg. Co., Weir Kilby Corp., Westinghouse Electric & Mfg. Co., West Virginia Rail Co. (Continued on page 356).

PROGRAM

FOURTH ANNUAL CONVENTION

PRACTICAL COAL OPERATING MEN

Music Hall, Cincinnati, Ohio

May 16-20, 1927

MONDAY, May 16, 1927

**FORMAL OPENING NATIONAL EXPOSITION
COAL MINE EQUIPMENT**

8 P. M.

Music Hall

Reception, Board of Directors, Manufacturers'
Division, The American Mining Congress
DANCING (Informal), 9 to 12 P. M.

South Hall, Music Hall

(Program to be announced later)

TUESDAY, MAY 17

10 A. M. to 12 Noon

CHAIRMAN—HOWARD N. EAVENSON, H. N.
Eavenson and Associates, Consulting Engineers,
Pittsburgh, Pa.

SUBJECT: COAL PREPARATION

**Recent Developments and Necessity for Coal
Preparation.**

E. A. HOLBROOK, Dean, School of Mines, Penn-
sylvania State College, State College, Pa.

Effects of Coal Cleaning on Its Marketability.

F. R. WADLEIGH, Consulting Mining Engi-
neer, New York City.

**Economical Methods of Eliminating Impurities in
the Preparation of Anthracite Coal.**

F. G. WILCOX, President, West End Coal Co.,
Scranton, Pa.

Discussion:

**Economical Methods of Eliminating Impurities in
the Preparation of Bituminous Coal.**

HUMPHREY D. SMITH, Assistant to President,
Majestic Collieries Co., Bluefield, W. Va.

Discussion:

**Preparation of Bituminous Coal by Sand Flotation
Process.**

J. WILLIAM WETTER, General Manager, Ma-
deira, Hill & Co., Philipsburg, Pa.

Discussion:

Cleaning Coal at Phelps Dodge Corporation.

J. B. MORROW, General Outside Supt., Stag
Canon Branch, Phelps Dodge Corporation,
Dawson, N. Mex.

TUESDAY, MAY 17

1.30 P. M. to 3.30 P. M.

CHAIRMAN—HARRY S. GAY, General Supt., Gay
Coal & Coke Company, Mt. Gay, W. Va.

SUBJECT: COAL PREPARATION

Cleaning Coal at the Colonial Breaker, Madeira
Hill & Company.

W. H. LESSER, Mechanical Superintendent,
Madeira, Hill & Company's Anthracite In-
terests, Frackville, Pa.

Discussion:

**Commercial Preparation of Anthracite by Sand
Flotation System.**

CHARLES DORRANCE, Mining Engineer, Scrant-
on, Pa.

Discussion:

**Cleaning Small Size Anthracite and Bituminous
Coals.**

LOUIS W. HUBER, Asst. Prof. of Mining, Car-
negie Institute of Tech., Pittsburgh, Pa.

Discussion:

Cleaning Coal by the Launder System.

SHELBY D. DIMMICK, Pres. and Gen. Mgr.,
Glen Alden Coal Co., Scranton, Pa.

Discussion:

Air Cleaning at Montour No. 10 Mine, Pittsburgh
Coal Company.

H. W. MORGAN, Director of Research, Pitts-
burgh Coal Company, Pittsburgh, Pa.

Discussion:

WEDNESDAY, MAY 18

10 A. M. to 12 Noon

CHAIRMAN—J. D. ZOOK, Vice Pres.-Gen. Mgr.,
O'Gara Coal Company, Chicago, Ill.

SUBJECT: COAL PREPARATION

Dry Cleaning of Coal at the Berwind White
Operations.

CHARLES ENZIAN, Mining Engineer, The Ber-
wind White Coal Mining Co., Windber, Pa.

Discussion:

Cleaning West Virginia Coal.

MILO W. SUMMERS, Engineer, Turkey Gap
Coal & Coke Co., Dott, W. Va.

Discussion:

Results Obtained in Cleaning Coal at Algoma
Coal & Coke Company.

WILLIAM BEURY, General Superintendent, Al-
goma Coal and Coke Co., Algoma, W. Va.

Discussion:

Preparing Coal by Table Washing Method.

ROBERT E. HOBART, Mechanical Superintend-
ent, The Lehigh Coal & Navigation Co.,
Lansford, Pa.

Discussion:

Preparation and Marketing Crop Line and Off
Grade Coals.

W. C. SHANK, President, The Carbon Coal
Company, Pittsburg, Kans.

Discussion:

Cleaning Coal by the Wet Jig Process.

E. E. FINN, Director of Research, The Le-
high Coal & Navigation Co., Lansford, Pa.

Discussion:

WEDNESDAY, MAY 18

1.30 P. M. to 3.30 P. M.

CHAIRMAN—DR. L. E. YOUNG, Vice President,
Pittsburgh Coal Co., Pittsburgh, Pa.

SUBJECT: MECHANICAL LOADING OF COAL

Recent Developments in Mechanical Loading.

G. B. SOUTHWARD, Mechanization Engineer,
The American Mining Congress, Washing-
ton, D. C.

Four Related Major Factors in Mechanical Mining.

H. F. MCCULLOUGH, Mechanical Engineer,
Consolidation Coal Company, Fairmont,
W. Va.

Developments in Cutting, Shearing, and Snubbing
with Mechanical Loading.

ROBERT J. SMITH, President, Princeton Min-
ing Co., Terre Haute, Ind.

Discussion:

To What Extent Does Roof Control Affect Me-
chanical Loading?

WM. G. FLETCHER, General Supt., Inland Col-
lieries Co., Indianola, Pa.

Is Mechanical Mining Dependent Upon Roof Control?

THOMAS W. DAWSON, Chief Engineer H. C. Frick Coke Co., Scottdale, Pa.

Discussion:**How Preparation Has Increased Use of Loaders in Coal Seams with Dirt Bands.**

DR. E. E. FYKE, President, Marion County Coal Co., Centralia, Ill.

Discussion:

THURSDAY, MAY 19

10 A. M. to 12 Noon

CHAIRMAN—A. W. DICKINSON, General Supt., Union Pacific Coal Co., Rock Springs, Wyo.

SUBJECT: MECHANICAL LOADING OF COAL

Conveyor System Applied to Longwall Mining.

D. A. THOMAS, President, Montevallo Coal Mining Co., Birmingham, Ala.

Discussion:**Conveyors Applied to Room and Pillar Mining.**

F. H. COLEMAN, Assistant Engineer, Graff Brothers, Blairsville, Pa.

Discussion:**Scraper Loaders Applied to Modified Longwall Mining.**

S. W. BLAKSLEE, Mine Supt., Pennsylvania Coal & Coke Co., Ehrenfeld, Pa.

Discussion:**Complete Recovery by Mechanical Mining.**

L. C. SKEEN, General Superintendent, Fordson Coal Company, Stone, Ky.

Discussion:**Mining in Wyoming by Mechanical Loading Exclusively.**

EDWARD BOTTOMLEY, General Superintendent, Sheridan-Wyoming Coal Co., Sheridan, Wyo.

Discussion:**Loading by Mechanical Methods Exclusively.**

DAVID INGLE, President, Ayrshire Coal Company, Oakland City, Ind.

Discussion:

THURSDAY, MAY 19

1.30 P. M. to 3.30 P. M.

CHAIRMAN—T. E. JENKINS, Vice President, West Kentucky Coal Co., Sturgis, Ky.

SUBJECT: MECHANICAL LOADING OF COAL

Entry Driving with Mechanical Loaders.

O. S. NEWTON, General Manager, The Sunday Creek Coal Co., Columbus, Ohio.

Discussion:**Mechanical Loading in Utah Coal.**

GEO. A. SCHULTZ, General Superintendent, Liberty Fuel Co., Latuda, Utah.

Discussion:**Maintenance of Mechanical Equipment.**

I. N. BAYLESS, General Superintendent, Union Colliery Co., Dowell, Ill.

Discussion:**Panel Development with Mechanical Loaders for Retreating Method.**

JAY I. SNODERLY, Chief Engineer, Bethlehem Coal Co., Fairmont, W. Va.

Discussion:**Mechanical Loading Under Draw Slate and Bad Roof.**

E. J. CHRISTY, Wheeling Township Coal Mining Co., Adena, Ohio.

Discussion:**Shaking Conveyors on Pillar Recovery.**

GEO. F. OSLER, Vice Pres. and Gen. Mgr., Pittsburgh Terminal Coal Corporation, Pittsburgh, Pa.

Discussion:

THURSDAY EVENING, MAY 19

7 P. M.

INFORMAL DINNER AND DANCE. FRENCH BALL ROOM. HOTEL SINTON

SPEAKERS—OTIS MOUSER, President Stonega Coke & Coal Co., Philadelphia, Pa.; NOAH H. SWAYNE,

Swayne & Co., Philadelphia, Pa., Nationally Known Humorist and Entertainer.

FRIDAY, MAY 20

10 A. M. to 12 NOON

CHAIRMAN—W. L. ROBISON, Youghiogeny & Ohio Coal Co., Cleveland, Ohio.

SUBJECT: SAFETY IN COAL PRODUCTION

Shall There Be Developed a National Safety Code?

Dean E. A. HOLBROOK, State College, Pa.

Safety Features in Mechanical Mining.

W. D. BRENNAN, General Manager; Stag Canon Fuel Co., Dawson, N. Mex.

Discussion:**Best Means to Keep Accident Prevention Before Men.**

CLYDE A. MCDOWELL, Asst. to Gen. Mgr. of Mines, Pittsburgh Coal Co., Pittsburgh, Pa.

EDWARD GRAFF, Mining Engineer, The New River Co., Macdonald, W. Va.

Discussion:**Improving Mine Safety Through Conference on Improved Foremanship.**

J. D. ROGERS, Chief Engineer, Stonega Coke & Coal Co., Big Stone Gap, Va.

Discussion:**When and How to Unseal Mine Fires:**

(a) Organization Procedure and Factors Governing Time Unsealing—J. J. FORBES, Supervising Engineer, U. S. Bureau of Mines, Pittsburgh, Pa.

(b) Relationship Between Sealing and Unsealing Mine Fires—J. T. RYAN, Vice Pres. & Gen. Mgr., Mine Safety Appliances Co., Pittsburgh, Pa.

(c) Safety Appliances and Accessories Used in Mine Fire Fighting and Recovery Operations—PROF. EDW. STEIDLE, Carnegie Institute, Pittsburgh, Pa.

Discussion from Operator's Viewpoint.

FRANK DUNBAR, General Supt., Hillman Coal & Coke Co., Pittsburgh, Pa.

Discussion from State Mine Inspector's Viewpoint.

R. M. LAMBIE, State Mine Inspector, Charleston, W. Va.

Discussion:**Handling Gases Through Proper Ventilation.**

DANIEL HARRINGTON, Safety Engineer, United States Bureau of Mines, Washington, D. C.

ROBERT MCALISTER, Chief Inspector Coal Mines, Fuel Dept., Colorado Fuel & Iron Co., Trinidad, Colo.

Discussion:

FRIDAY, MAY 20

1.30 TO 3.30 P. M.

CHAIRMAN—ERSKINE RAMSAY, Cons. Engineer, Alabama By-Products Corp., Birmingham, Ala.

SUBJECT: CUTTING AND BLASTING

Moving Picture, "The Duties of the Explosives Engineer."

Courtesy United States Bureau of Mines.

Under What Conditions Should Top and Bottom Cutters Be Used?

T. W. GUY, General Superintendent, Boone County Coal Corporation, Sharples, W. Va.

W. Z. PRICE, Assistant to President, Warner Collieries Co., Washington, Pa.

Discussion:**Reducing Blasting Costs Through Supervision.**

C. E. CARDEN, Superintendent, The Gauley Mountain Coal Co., Jodie, W. Va.

Discussion:**Blasting and Preparation for Mechanical Loaders.**

ROY T. LYONS, Engineer, Consolidated Coal Co., Saginaw, Mich.

Discussion:**How Blasting Efficiency Increases Production.**

H. G. MUNDY, Superintendent, Century Coal Co., Century, W. Va.

Discussion:

ADJOURNMENT.

MECHANIZATION—THE DAWN OF A NEW ERA

Preliminary Report Setting Forth Object And Purpose Of Investigation Being Conducted For American Mining Congress—Mechanization Includes Mechanical Loaders, Scrapers, Conveyors—Reports To Show What Is Being Accomplished

THE American Mining Congress, as has been announced in several past issues of THE MINING CONGRESS JOURNAL, is conducting an investigative survey on mechanized mining as it has been developed and is now being used in the bituminous and anthracite coal mines of the United States—the term “mechanized mining” including operations by mechanical loaders, scrapers, and conveyors. This investigation is being made under the direction of the Mining and Loading Equipment Section of the Standardization Division, and as this article is the first of a series which is to be published as a part of this report it will perhaps be best to use it to explain in some detail the object of the survey and the purpose of the report. Before going into detail, however, it may be said in general that the main object and purpose is the same as that which is behind all work undertaken by the American Mining Congress—to be of help to the mining industry—and since successful mechanization is held by many to be a solution for some of the problems and difficulties which confront coal mining, it has seemed proper that the Mining Congress—as an impartial and disinterested agency—should determine the extent of and the results being attained by mechanized mining in its present state of development.

The fact that this investigation is being made under the direction of the Standardization Division has caused the question to be raised as to whether it is the object to attempt to standardize mechanical mining methods or equipment. The answer to this is a decided NO. It is of course possible that the report may indicate that certain methods and types of equipment under certain mining conditions have, so far, proven more effective than other methods under similar conditions or perhaps that certain methods seem best adapted to very special conditions. If this situation does occur there is no desire on the part of the American Mining Congress at this time to appear to be recommending either for or against any particular min-

By G. B. SOUTHWARD*

ing method or type of mechanical equipment for any general or special set of conditions. This will very probably come

“ . . . the immediate object of our investigation is to inspect a number of mechanical loading and conveyor mining operations as now being worked under a variety of physical conditions and operating requirements, and to observe the methods used and results attained at these operations by the different types of mining equipment.”

later, but before we can talk of standardization or recommended practices we must first know more about our subject, and the immediate object of our investigation is to inspect a number of mechanical loading and conveyor mining operations as now being worked under a variety of physical conditions and operating requirements and to observe the methods used and the results attained at these various operations by the different types of mining equipment. As the survey continues, reports will be made covering each operation, which will be published in THE MINING CONGRESS JOURNAL so that a fairly complete record, showing how mechanical mining is being carried on, will be available for the entire coal mining industry.

Before considering in detail the various phases of mechanical operation to be

“As the survey continues reports will be made concerning each operation, which will be published in The Mining Congress Journal, so that a fairly complete record showing how mechanical mining is being carried on will be available for the entire coal mining industry.”

covered by these reports, it may be best to state briefly the progress that has been made by mechanized mining. At the present writing the survey has only included operations in the coal fields east of the Mississippi River—extending from Pennsylvania to Alabama—but in these fields there is enough to warrant the statement that mechanical loading and conveyor mining has been developed

and is being used to a far greater extent and is on a much firmer operating basis than the coal industry as a whole realizes. The number of operations that are using mechanized mining methods is not large in comparison with the total number of mines using hand loading, but when it is known that the mechanical operations are installing additional equipment and increasing their output, that quite a number are now on a 100 percent mechanical basis and some are producing

several thousand tons of coal per day from a single mine, and that these mines are working full time in direct competition with adjacent handloading mines, then their importance becomes impressive. When it is learned further that these operations, instead of being confined to “6 feet of clean coal with good top,” as is popularly supposed, are mining under a range of conditions varying from coal 30 inches thick to 9 feet and over, from clean seams to seams that have as high as 40 percent impurities, from level seams to seams that pitch as much as 18 degrees, from top that requires no timbering in the rooms to top that requires cross bars in the headings, then it will perhaps be realized that mechanized mining has reached a position where it has something to tell and something to offer to the coal-mining industry.

By describing the methods used at a number of successful operations, it is believed that there will be in these reports something of value to those who are now operating mechanically as well as to those who are considering doing so. However, before anyone can judge correctly or form an accurate opinion as to what is being done by mechanized mining, he must first understand just what it is that mechanization is trying to do in each instance where it is being used. It is, therefore, the desire in submitting this report to emphasize the importance of studying and analyzing the conditions under which these operations are being carried on before forming any opinions as to the results being accomplished or the adaptability of any particular method to other conditions.

* Mechanization Engineer, The American Mining Congress.

Consulting Engineer, Elkins, W. Va.

As we go further into the question of mechanized mining we see that instead of it being the simple process of loading coal it is a series of related or coordinated operations. Among coal operators we find little disagreement as to the mechanical efficiency of the various types of equipment being used, and it is generally admitted that mechanical loaders will load coal and that scrapers or conveyors will transport it. From there on, however, differences of opinion exist as to which of the other mining operations is the most important and the one on which successful mechanization most depends. One man will say it is transportation, another that it is proper shooting, and a third that it is adequate preparation or cleaning. It is certain that before coal can be loaded it must be shot down, and after it is shot and loaded it must be transported or moved so as not to retard or delay the subsequent loading, and along with these operations the coal must be cleaned of impurities so as to be marketable. When we consider the necessity of performing each and all of these details in an efficient and satisfactory manner it would seem that the correct answer as to which one is the most important is about the same as the answer to the question, "Which is the most important leg in a three legged stool?" Clearly, if one operation at a certain mine appears to be of outstanding importance and overshadows the others, it must be because that operation has the more difficult solution at that particular mine and consequently its successful solution has an added value. But that still does not alter the fact that in mechanical mining there is no one or single difficulty to be overcome, and that there is no one or single object to be accomplished.

Some exception may perhaps be taken to this statement, particularly to the latter part, and it will be said that mechanized mining has but one main object which is to load coal at a lower mining cost than can be made with hand loading. This is, of course, true looking at the subject in a general way, but mechanization is not being applied in a general way to our coal mines. By that is meant that mechanization is being applied under such variety of mining methods, seam conditions, and market requirements that generalizations which may be formulated to fit all cases are apt to be of little or no practicable value in solving the different operating details imposed by these con-

*"The number of operations using mechanized mining methods is not large in comparison with total number of mines using hand loading, but when it is known that the mechanical operations are installing additional equipment and increasing their output; that quite a number are now on a 100 per cent mechanical basis; that some are producing several thousand tons of coal per day from a single mine; and that these mines are working full time in direct competition with adjacent hand loading mines---then their importance becomes impressive * * * When it is learned further that these operations are mining under a range of conditions varying from coal thirty inches to nine feet; from clean seams to seams that have as high as 40 percent impurities; from level seams to seams that pitch as much as 18 degrees; from top that requires no timbering in the rooms to top that requires cross bars in the headings---then it will perhaps be realized that mechanized mining has reached a position where it has something to tell and something to offer the Coal Industry."*

ditions and requirements. For instance, one operator is preparing domestic coal and wants a high percentage of lump, a second is selling steam or coking coal and does not particularly care for large sizes, a third depends on hand cleaning inside the mine, a fourth picks or cleans



G. B. Southward

his coal on the surface, a fifth desires a high pillar recovery, a sixth does not want any pillar recovery, and so on. Add to these different operating requirements the physical variations encountered—high and low coal, hard and soft coal, clean and dirty seams, level and pitching seams, good roof and bad roof—and we find almost as many different combinations of conditions as there are hands in a deck of cards. And since the reports will show and describe operations under these varying conditions, it will in effect "place the cards on the table face up."

Each report that will be submitted will show by sketches and descriptions the mining methods employed and each operation will be covered according to the following form or outline:

SKETCH OF THE MINING SYSTEM

Physical Conditions:

Height of seam, partings, structure of coal, character of roof and bottom, pitch of seam, depth of cover, open or closed lights.

Mining System:

Room and pillar or longwall, advancing or retreating, mechanical or hand loading in entries, rooms, pillars, or on long faces. Dimensions of standard panel. Number of machines in a panel. Number of working places in a panel.

Mechanical Operation:

Description of operating method. Capacity of mine cars and number of cars placed for loading. Cars shifted by locomotive or live stock. Gage and weight of track. Drilling, cutting, shearing, snubbing, shooting. Type of explosive, number of shots, degree of breakage by shooting. Inside slate picking.

Timbering and Roof Action:

Character of roof supports in entries, rooms and pillars. Method of timbering on longwall faces. Roof action on faces. Timber recovery. Coal recovery.

Operating Crew:

Work on day or night shift. Number of men on each shift. Men on each operation. Extra work required. Number of places loaded per day. Daily tonnage.

Equipment:

Loaders, cutting machines, locomotives, drills for one operating unit.

Preparation:

Sizes compared to hand mining. Amount of slate picking. Mechanical picking or cleaning plant. Cleaning requirements compared to hand loading.

Conclusion:

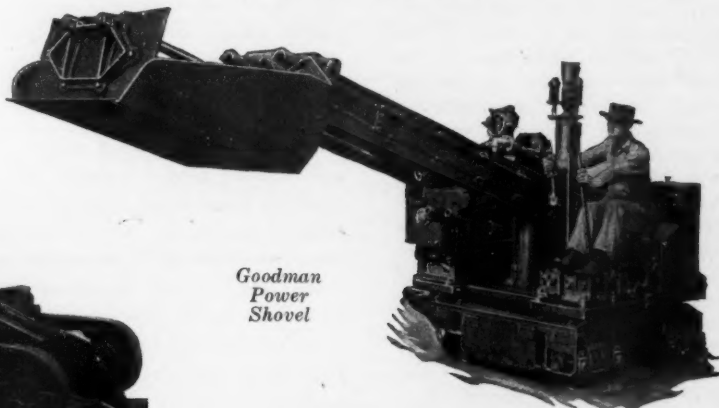
Percentage of mine output by mechanical loading—time mechanization has been in use. Opinion of management as to success and practicability.

In making the investigation it was understood that the questions of mining

costs and labor rates at the mines visited would not be inquired into, as this is confidential information which the industry has no right to ask or expect from any individual operator. In almost every case, however, there has been a general statement from the management as to whether or not mechanical loading operation was economically successful, and without definitely stating the exact amount of saving effected this statement is sufficient for the purposes of the present report. In many cases the management was willing to permit the inspection, but did not want the company's name published in connection with the report, so in order to further insure this privacy no names of seams or geographical locations will be stated as a part of any report on a specific operation. It is further understood that the term "mechanized mining," or "mechanization," covers the use of mechanical load-



Joy Permissible Loading Machine



*Goodman
Power
Shovel*



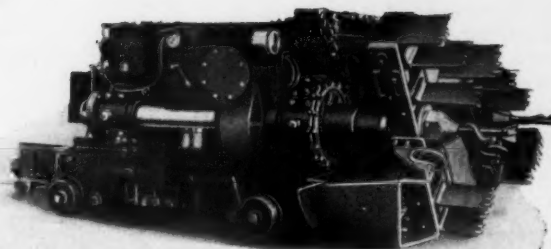
Myers-Whaley Shoveling Machine



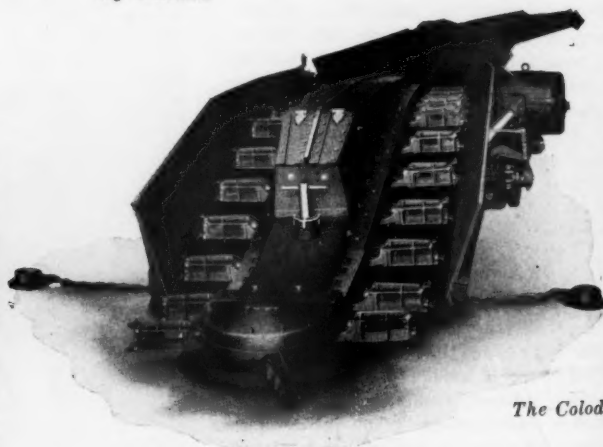
Jeffrey "Shortwaloader"



Goodman Entryloader

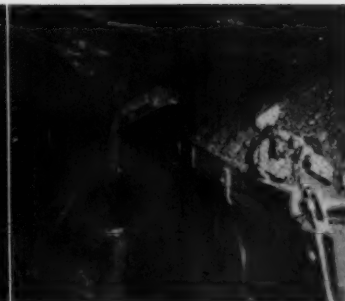


*McKinlay Mining and Load-
ing Machine*

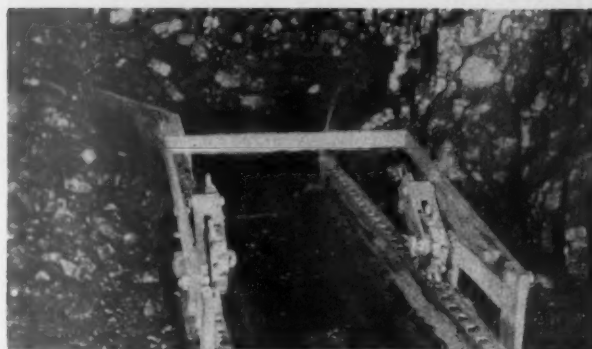
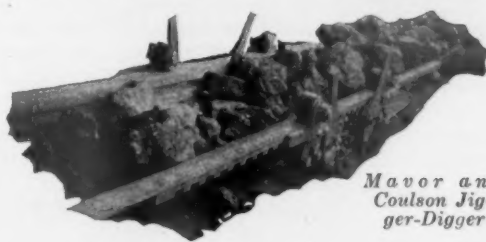


The Coloder

**TYPES OF MECHANICAL LOADING
MACHINES USED IN COAL
MINES**

*Jeffrey Conveyor Loader**Lorain Sectional Conveyor**Lorain Loading Boom**Link-Belt Long Face Conveyor**Link-Belt Kangaroo Conveyor*

**TYPES OF
CONVEYORS IN
USE IN COAL
MINING**

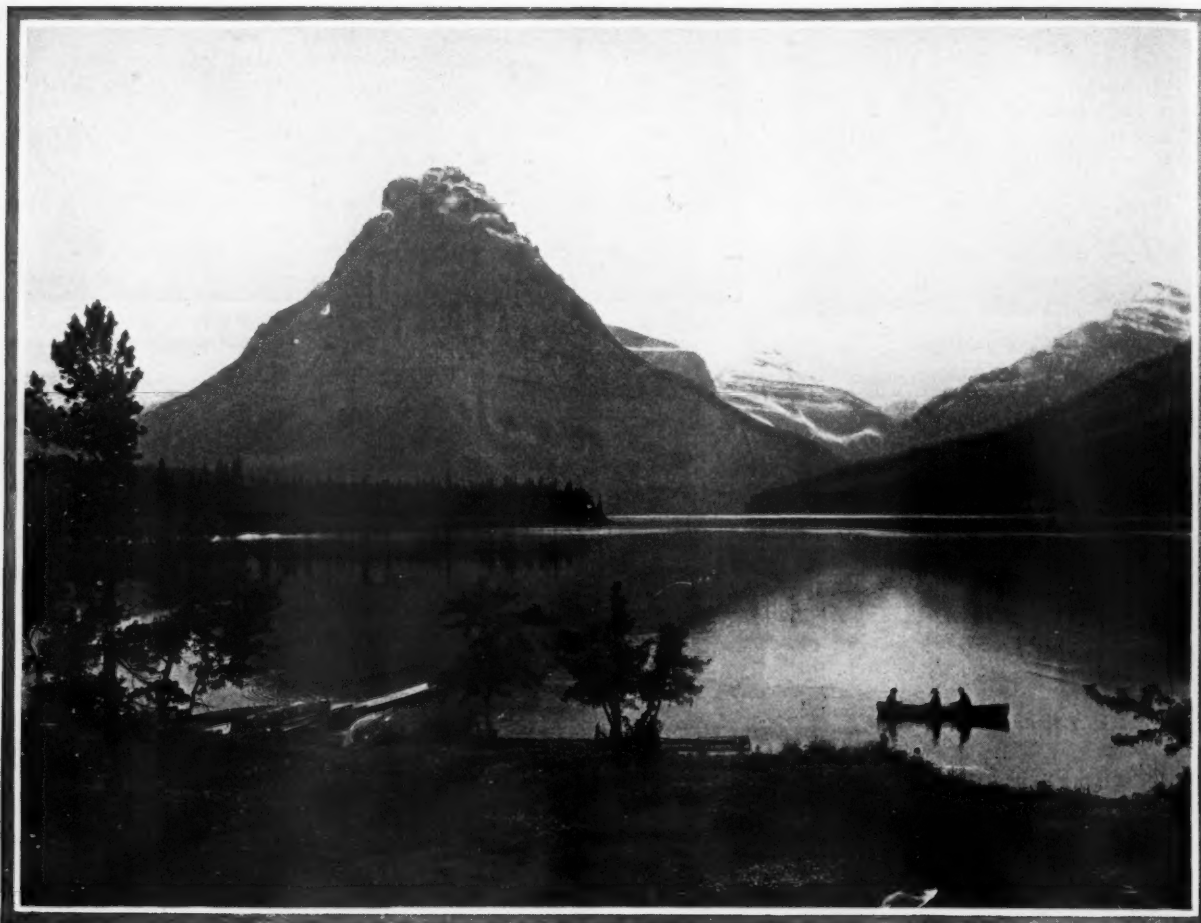
*Koalveyor Drive Connection from Main to Face Conveyor**Eickhoff Conveyor with Duckbill Loader**Mavor and
Coulson Jig-
ger-Digger**Jeffrey Sectional Conveyor*

ers, conveyors and scrapers under ground, and in describing the operations by these different machines each machine will be referred to as a certain type and not by the manufacturer's name. This is done in order that these reports will not appear to advertise either for or against any specific make of equipment.

When the investigation was first proposed it was the thought to include all mechanized mining operations in the United States but a difficulty was immediately encountered in attempting to carry out this program. After the sur-

vey was started it was found that there are quite a number of mines where mechanical equipment has been installed but its operation has not yet reached a point where the results have proved or disproved anything and to try to include all these would require too much time before the survey could cover sufficient territory to be fairly comprehensive in its report and conclusions. So the investi-

gation was then restricted, for the time being at least, only to include in each mining district a number of representative mechanical operations where the mining had been carried to such a point that the (Continued on page 359)



Two Medicine Lake, Glacier National Park

Courtesy National Park Service, Interior Department

FEDERAL DOMINATION VS. STATE SOVEREIGNTY

Intelligent And Intensive Instruction In Public Schools—Fundamental Principles Of Constitution Only Effective Safe-guard Against All Isms — Government Ownership Violation Of Principles Of Constitution

By CHAS. L. GILMORE *

WE have a government founded upon the broadest and best principles of freedom and the Golden Rule that is possible to create through human agencies.

Why should we not throw off this false premise of centralized power and return to the theory of law and order prepared for us by our forefathers? Why should not the states govern themselves according to the ancient standard? Why should not the Constitution of the United States be recognized as well by the Congress and the Supreme Court as by the lowliest citizen? Why establish one rule of conduct for one thing and an entirely dissimilar one for another? If the states are equal, and if they came into this union on terms of absolute

equality, then why not make the equality actual and tangible?

Nor is this task any impossible thing. To be a good and loyal citizen of this country does not mean merely taking off your hat as the flag goes by, nor enlisting in the army or navy during time of war. It means also and principally a keen interest in the affairs of government and a thorough understanding of the basic rules formulated for the guidance of this government.

The second paragraph of the Declaration of Independence contains an unanswerable indictment of present day bureaucracy. The necessity for a renewal of those principles is apparent if the people of the several states are to

retain their right of self-government. Bureaucratic control of government by job-holders in Washington is a constant increasing menace to the continued existence of the Republic. There are hundreds of regulations written by unknown clerks in Washington, which, if you happen to violate one of them, will cause you to spend such term in prison as the Federal judge sitting in your case deems necessary to punish you.

FORGOTTEN FUNDAMENTALS

The text books in our public schools are, in the main, a job lot of propaganda. When but 65 percent of the citizens ever register and only 60 percent of those ever vote, there is something radically wrong with an educational system that does not teach the young citizen better than that.

* Attorney-at-Law, Sacramento, Calif.

A compulsory course in those subjects should be required in every elementary and high school in the country. Not any of these split second periods, but such a course of training that will give any graduate of any elementary school a working knowledge of the fundamentals of the laws of the land, and will enable a high school graduate to understand some of the alleged intricacies of constitutional law.

None of the isms that beset us on every side could make any headway with the boy or girl fairly taught the underlying principles of the American government.

CONSCIENTIOUS OBJECTORS

Over-zealous educators and propagandists will belittle such a plan. They usually argue that if we attempt such a scheme that we will be turning our public schools into law colleges when there are already too many lawyers in the country. But will they set their hands to forming any other plan that will better tend to equip our boys and girls to face a cold world across whose broad expanse is written "Ignorance of the law is no excuse?" Will it make him or her a better or more useful citizen to seal the book of law during his or her whole school life? We teach them everything, including all the propaganda that Federal bureaus and commissions can cram into the books, and turn them loose on the world totally ignorant of the simple fundamentals of law. Sans rudder, sans compass, sans navigation knowledge their ships are wrecked on the propagandists rocks.

GOVERNMENT OWNERSHIP

The success of Federal interference in the rights of the several states is also largely fostered through the efforts of those misguided souls who believe that the panacea for all our ills is for the government to take over and run everything. Whenever anything goes wrong, such as a coal strike, for instance, these champions of governmental ownership loudly shout for the government to take over the mines and operate them. Of course, the details of operation are not furnished by the champion—that is part of the government's job.

Governments are established solely for the purposes of protecting life and liberty and to promote the general welfare of the inhabitants. If government stays with that original principle and confines itself and its operations to those activities for which it was established, it certainly has all the work it can do. When government enters the real estate business, the railroad business, the mining business, or in fact any business except that of providing civil government for the inhabitants, it is doomed to fail. It fails simply because it was not intended

to be a commercial organization. If it was intended to be a commercial organization, and not an affair to provide civil government for the people, there would naturally be an entirely different constitution. If this government should embark on a fraction of the commercial enterprises urged upon it by the proponents of government ownership, the Republic of the United States would cease to exist. We would necessarily require a strongly centralized government akin to a dictator, and abolish all local and state government.

But the constant drop of water wears away the hardest stone and these zealous but misguided souls advocating the theory of governmental activity in all lines of business have brought about a very material change in the complexion of this nation. Much of the change has been wrought through the propaganda broadcasted by the multitude of boards, bureaus and commissions that Washington harbors. That propaganda finds millions of ready listeners and believers, because is it not the government speaking? From time to time special writers and novelists, finding the field a fruitful one from the standpoint of sales, add their writings to the crop, and so this propaganda has become firmly rooted in a large part of our population. But it may be exterminated, notwithstanding that it may require heroic measures and the vacating of a few seats in Congress and certain judicial positions.

The individual in public office who tackles the job will have to work fast because he will have but the one term to accomplish that which he sets out to do. He will never get re-elected, because it has been shown many, many times that the public officer who stands on his own feet and battles against this bureaucracy and sincerely endeavors to cut down on the number of job-holders in Federal pay, never gets another term of office. The political power behind bureaucracy is tremendous and it can defeat governors of states just as easily as it can defeat a United States Senator.

SIMILARITY OF PURPOSE

In the main there is little difference between the theory of the commune and government ownership, and there is little difference between the idea of centralizing all government at Washington and the commune. They all work out the same way in the end. They may pursue slightly different paths, but the ultimate goal is the same. They all operate to abolish individual effort, individual thought and individual enterprise. They all act to crush competition in trade, science and art. Nothing approaching individuality can exist under any of them.

The United States of America has contributed, through its people, more to the

general progress of the world than any other nation on earth during the same period. In the world of invention and application of modern mechanics, the United States stands at the head of the class. This progress is due wholly to the fact that throughout the history of this country, every person has had the inherent right to exercise his or her talents in their fullest endeavor without let or hindrance from governmental authority. The inventor, the scientist, the worker, the capitalist have been free to work for themselves and reap the rewards of skillful effort. In any nation where the central government runs and rules everything, none of those classes have an opportunity to display their powers nor to exercise individual ingenuity. A government brooks no rivalry and thus there is created a monopoly.

WHAT PRICE LETHARGY?

With a return to the original form we would be able to simplify and solve many of our alleged problems. Ours is not a complicated government. On the contrary it is simplicity itself. We need but follow the rules and regulations laid down in the Declaration of Independence and the Constitution of the United States. When we violate those provisions, we depart from the form of government we are supposed to maintain. When our law-making bodies scramble our divisions of government as they have done in the past and continue doing every session of Congress, is it not a cause for wonder that government does not function as efficiently as it should. When Congress refuses to do and perform the work allotted to it as the supreme law-making body of the land and turns the legislative authority over to the several administrative divisions of the government, we naturally encounter complications. And when Congress goes further and allows those administrative bodies to create and operate their own courts, independent of the established judicial authority, additional complications naturally ensue. Then when those independent courts are established by those administrative departments, they do not require any legal knowledge nor any training in the law as a prerequisite to appointment. The individual sitting as a judge is a lawyer only in exceptional instances.

As an example of the legislation of some of these administrative offices of the government we quote from a regulation on page 4-G of the "Forest Service Bible" expounding the authority of the Secretary of Agriculture,

"whose regulations govern the use of public lands within the national forests, and are supreme, even though the state law is in conflict with them."

(Continued on page 356)



COAL

PRACTICAL OPERATING MEN'S DEPARTMENT

NEWELL G. ALFORD, Editor

*Practical Operating Problems of the
Coal Mining Industry*



PROGRESS IN PRODUCTION OF LUMP COAL AT NO. 5 MINE, COSGROVE-MEEHAN COAL CORPORATION

*Benefits Derived From Campaign Of Production of Maximum Tonnage Per Box Of Powder
Highly Satisfactory — Results Obtained Through Cooperation Of Everyone*

By C. T. HAYDEN *

THE production of a maximum percentage of the larger sizes of coal at our mines is one of the most important considerations at all times. Prior to 1898, when the tonnage miners were paid for only the coal that passed over 1½-in. bar screen, or what today approximates our 2-in. lump coal, less than 20 percent of all coal hoisted would pass through a 2-inch round opening. Today, an average of 48 percent of all coal hoisted would pass through a 2-in. round opening. Today, an average of 48 percent of all coal hoisted in the state of Illinois will pass through the same size opening.

When this company assumed operations at No. 5 mine, located at Panama, Ill., the miners were producing about 115 tons of coal per 25-lb. box of permissible powder, and an average of 66 percent of all coal hoisted was over 1½ in. in size. During the first few months of our operation, a general effort was made to reduce the amount of powder used by the miners, but not until September, 1925, was a definite program adopted and followed. Since that date each month has shown an increase in the tonnage produced per box of powder, and a corresponding increase in the percentage of 1½-in. lump coal. During the month of April, 1926, 176 tons of coal were hoisted for each box of powder used by

the miners, and 71.8 percent of all coal hoisted was over 1½-in. in size.

Calculated on the basis of the average realization for all coal sold from this mine during the year 1925, we find that for each one percent we increase the proportion of 1½-in. lump, the value of each ton of coal hoisted is increased \$0.0135. An increase of 5.8 percent in the proportion of lump coal means increasing the value of all coal hoisted \$0.0783 per ton.

The benefits derived from the campaign of producing a maximum tonnage per box of powder have not been confined entirely to the operating company, but the miners themselves have likewise

shared. The cost of explosives to the miners has been reduced 35 percent and by increasing the percentage and quality of the 8 inch lump, through decreasing the amount of explosives used, the annual working time of the mine has been materially increased.

The accomplishment of the above has meant, first, a complete analysis of blasting operations to determine just where too much powder was being used; and second, the united cooperation of every one from the superintendent to the individual miner to reduce the amount of powder to a minimum. The results secured to date have certainly been worth the effort, and the local management expects to secure and maintain a further improvement.

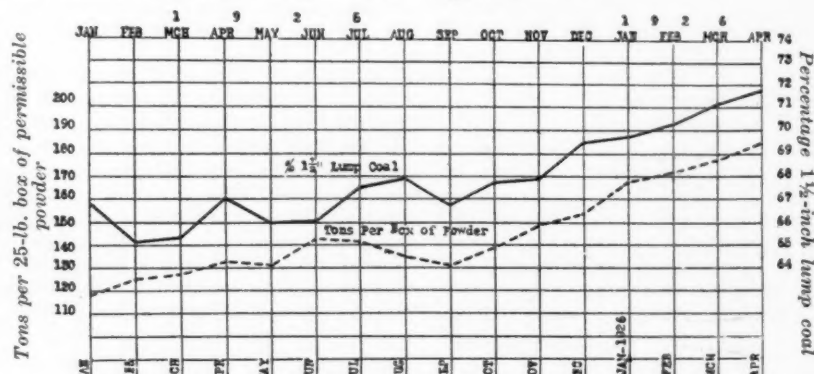


Chart Showing the Relation Between Number Tons of Coal Secured Per Box of Permissible Powder and Percentage of Lump Produced

* Chief Engineer, Cosgrove-Meehan Coal Corporation, Marion, Ill.

SUITABILITY OF VARIOUS EXPLOSIVES FOR COAL MINES*

Black Powder Still Leads Permissible Explosives In Consumption—Coal Dust Is Inevitable In Bituminous Coal Mines—The Hazards Of Various Explosives Classified And Recommended Practice Outlined

By J. E. TIFFANY†

EXplosives are used in coal mines not only for blasting coal at the working faces but for other purposes, such as sinking shafts through rock, rock tunneling, brushing roof, grading haulage roads, and shooting rock where overcasts are to be built.

CLASSES OF EXPLOSIVES USED

A great variety of explosives is used. Black blasting powder represents about 57 percent of the quantity consumed and is employed for blasting a little more than half of the coal mined. The remainder of the coal mined is largely blasted by means of permissible explosives, which are used to the extent of about 27 percent. High explosives other than permissibles that represent about 16 percent of the total quantity are used to a limited extent in the shooting of bituminous coal, and to a somewhat larger extent for anthracite; high explosives are used mostly for rock work in coal mines.

The quantity of each explosive that is used does not represent its relative fitness, because the first consideration should be safety in order to guard against mine explosions, which in the past have been the cause of much loss of life and property. From this point of view, the fitness of explosives for use in coal mines should be based on

their safety when fired in the presence of firedamp and coal dust. After determining this, then the efficiency of the explosive for doing the required work can be considered.

PERMISSIBLE EXPLOSIVES RECOMMENDED

The Bureau of Mines carries out tests on explosives for coal mines which establish their relative safety when fired in the presence of gas and coal dust and are used in accordance with the conditions prescribed by the bureau. Only those explosives which have passed these tests and are listed‡ by the bureau as permissible explosives should be exclusively used in coal mines. This recommendation is in accordance with one recently made by the bureau and arose from a realization of the dangers attending the use of black blasting powder. The bureau also advocates that permissible explosives be fired electrically and as an aid to blasting, all coal which it is feasible to cut should be cut or sheared.

The cutting and shearing of coal tends toward safety and efficiency, as does also the practice of spraying water on the cutter-bars.

HAZARDS IN COAL MINES

It is desirable to use permissible explosives in coal mines, because in the first place all coal mines are potentially gassy and the liberation of methane, which is an inflammable gas, may be brought about at any time by the mining of coal in which the gas may be occluded. The liberation of gas permits it to mix with the mine air.

A suitable source of flame or spark will ignite with explosive violence a mixture of air in which is present from about 5 to 13 percent of methane, and lower proportions of the gas will increase the inflammability of air-coal dust mixtures. Coal dust is always present in coal mines and becomes lodged on the floor, ribs, and roof of an entry or room. All coal dusts, other than anthracite dust, when raised in a cloud and mixed with air, form explosive mixtures that are also ignitable by some suitable source of flame or spark.

FLAMES OF EXPLOSIVES

All explosives, when fired, produce flames; none are flameless. Therefore, if the flame that is projected into the working place, when a charge of explosive is fired, is of sufficient duration, length, and temperature, it will ignite the firedamp or dust that may be present in a coal mine and be the cause of an explosion. It should also be borne in mind that almost any explosive, if fired in sufficient quantity, will ignite firedamp and dust. The Bureau of Mines has arbitrarily established a charge limit of 1½ pounds, and in order that an explosive may be placed on the permissible list it must pass the gas and dust test with a charge of 1½ pounds.

In blasting in coal mines this charge per drill-hole should never be exceeded and not more than one hole should be fired at a time.

The length of the flame of a charge of black blasting powder is 2½ times that of a similar charge of an average permissible explosive and its duration is 4,500 times. Figure 1 shows flame photographs that were taken on a film placed around a revolving drum, for both black blasting powder and a permissible explosive. Figure 2 shows the result of firing a charge of a non-permissible explosive into a steel gallery at the Bureau of Mines Explosives Experiment Station. Finely ground bituminous coal dust had been placed on side shelves inside the gallery.

CLASSES OF EXPLOSIVES

All of the explosives used in coal mines may be divided into two classes, designated as low explosives and high explosives. Those of the first class, which includes black blasting powder, are ignited by the flame from a squib or fuse; and explosives of the second class, which include the various classes and grades of dynamites and permissible explosives, are fired by the use of a detonator.

* Published with approval of the Director, Bureau of Mines.

† Explosives Testing Engineer, Pittsburgh Experiment Station.

‡ Crawshaw, J. E., Isley, L. C., Parker, D. J., and Fieldner, A. C., Permissible Explosives, Mining Equipment and Apparatus Approved Prior to January 1, 1925: Tech. Paper 376, Bureau of Mines, 1925, 35 pp.

Perrott, G. St. J., Additions, Removals, and Changes in Permissible List of Explosives from January 1, 1925, to July 31, 1926. Reports of Investigations Serial No. 2770, Bureau of Mines, Sept. 1926, 3 pp.

PERMISSIBLE EXPLOSIVE

R.P.M. 2400 Duration of flame .342 millisec.
Height of flame 19.79 in.



BLACK BLASTING POWDER

R.P.M. 37.5 Duration of flame 1539 millisec.
Height of flame 50.21 in.

Fig. 1. Relative duration and height of flame for permissible explosive and black blasting powder

The explosive force of explosives largely depends upon the rapid union of oxygen and carbon whereby the solid particles, which occupy a relatively small space before explosion, are converted into highly heated gases occupying from 5,000 to 10,000 times the volume of the original solid particles.

A brief description of the nature and characteristics of some of the explosives used in coal mines follows:

LOW EXPLOSIVES

Black blasting powder is a low explosive and is the most commonly used non-permissible. The percentage and actual quantity of this explosive used in coal mines is steadily declining.

As manufactured in the United States, it is made up of an intimate mixture of sodium nitrate, charcoal, and sulfur, and is formed into grains of different sizes. The sizes commonly used are designated as FFFF, FFF, FF, F, C, CC, and CCC. The grains are usually glazed with graphite, which renders them free-running and tends to make them impervious to moisture.

HAZARDS OF USING BLACK BLASTING POWDER

Tests made by the Bureau of Mines have shown that black blasting powder will not pass the tests for permissibility, neither will any known modification of it. Other tests made by the bureau have shown that a charge of black blasting powder, as low as 1/10 ounce tamped with 1 pound of fireclay, and fired into an explosive mixture containing 8 percent of gas will cause the gas mixture to explode, whereas a charge approximately 80 times as large of a permissible explosive will not.

There are three main reasons why such large quantities of black blasting powder are used: (1) Low cost; (2) miners and operators who blast with it are accustomed to it and are often jointly averse to making a change to permissible explosives; and (3) its strength characteristics. The last phase will be taken up later.

The hazards of handling and using black blasting powder were discussed by the writer in a previous article in this JOURNAL,** and these, together with the hazards to life and property in its liability to cause mine explosions, thoroughly establish its unfitness for use in coal mines.

HIGH EXPLOSIVES

The high explosives commonly used in coal mines are dynamites and permissible explosives. These high explosives may be subdivided into straight nitroglycerin, ammonia, gelatin and nitro-starch dynamites and modifications of



Fig. 2. Bureau of Mines gas and dust gallery for testing safety of explosives. This picture shows the result of firing non-permissible explosive into coal dust

each subdivision for permissible explosives.

HAZARDS OF USING DYNAMITES

The use of dynamites in coal mines introduces an unnecessary hazard, regardless of the kind of blasting to be performed. The flame temperatures of dynamites are too high to be used with safety in the presence of gas or coal dust, therefore suitable permissible explosives should be used in their place.

STRAIGHT NITROGLYCERIN DYNAMITES

The straight nitroglycerin dynamites contain a liquid explosive ingredient known as nitroglycerin, which is absorbed in woodpulp or other suitable carbonaceous combustible material. Sodium nitrate is also added for the purpose of oxidizing the absorbent.

The grade of the dynamite is based on the percentage of nitroglycerin present. The grades range from 15 to 60 percent.

When used in coal mines, dynamites are generally used for blasting hard or

tough rock, and particularly for grading haulage roads.

AMMONIA DYNAMITES

In the ammonia dynamites about half the nitroglycerin of the straight dynamites is replaced by ammonium nitrate. The grades of ammonia dynamites range from 30 to 60 percent, and correspond very closely in strength to those of the straight nitroglycerin grades.

BLASTING GELATIN AND GELATIN DYNAMITES

Blasting gelatin is a stiff gelatinous substance containing nitroglycerin gelatinized by the addition of a small percentage of nitrocellulose. Blasting gelatin is a very powerful explosive, but is usually diluted by the addition of substances like wood pulp mixed with sodium nitrate. These mixtures produce the various grades of gelatin dynamites, which range in strength from 30 to 70 percent. They are used where tough rock has to be blasted, and are very suitable for wet blasting on account of their water-resistant properties.



Fig. 3. Ballistic pendulum for determining the unit deflective charge of an explosive—that is, a measure of the "coal getting" strength of an explosive

**Tiffany, J. E., Safety and Economy in Handling Explosives. The Mining Congress Journal, Aug., 1926, pp. 593-597.

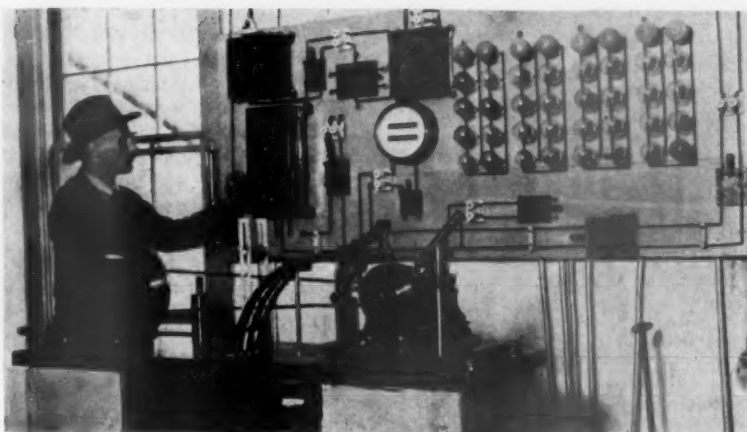


Fig. 4. Mettegang Recorder. The rate or velocity of detonation of an explosive is determined on a meter length. A continuous file of six cartridges of the explosive to be tested is placed in a galvanized iron tube which is suspended in a boom-proof. The time elapsing between the breaking of the two wires which pass through two points one meter apart in the explosive is registered electrically by the recorder

NITROSTARCH POWDERS

The characteristic ingredient of nitrostarch powders is a solid substance known as nitrostarch.

PERMISSIBLE EXPLOSIVES

Most of the high explosives used in coal mines, with the exception of the nitrostarch powders, contain nitroglycerin, and with but few exceptions this is also true of permissible explosives. Explosives of many different compositions are now on the permissible list that have been formulated to produce explosives of low flame temperature of short duration. For this purpose, where nitroglycerin is used, the quantity present is usually low. The general methods of bringing about a reduction in flame temperature of explosive mixtures containing nitroglycerin, and that correspond somewhat closely to the straight nitroglycerin dynamites, is by the addition of free water, an excess of carbon; or salts containing water of crystallization. The methods used in other permissible explosives is to add inert materials or volatile salts.

To the users of coal mine explosives the composition is of little importance, because if an explosive is listed as permissible, the operator has the assurance that it can be used with safety. It is only necessary to consider the composition when certain conditions have to be met; for example, gelatinized explosives are more impervious to moisture and can be used to greater advantage in wet working places than ammonium nitrate explosives. The later class, however, when put up in well-made paraffined and redipped cartridges usually resist water successfully as ordinarily used in wet places. Such cartridges should not be broken or slit in any manner when used in wet holes.

CLASSIFICATION OF PERMISSIBLE EXPLOSIVES

The Bureau of Mines classifies permissible explosives in two ways, first, on the basis of the characteristic ingredient of the explosive, and then on the basis of the volume of poisonous gases produced by 1½ pounds of the explosive.

CLASSIFICATION ACCORDING TO CHARACTERISTIC INGREDIENT

There are five classes under this heading, although the permissible explosives now most commonly used fall in Class 1a, as follows:

Class 1.—In this class the characteristic ingredient is ammonium nitrate. This class is further divided into two subclasses, a and b. In subclass a, a sensitizer is used that is in itself an explosive. A low percentage of nitroglycerin is the usual sensitizer. At present there are no explosives listed in subclass b.

Class 2.—In this class the characteristic ingredients are salts with water of crystallization added to mixtures containing nitroglycerin.

Class 3.—Permissible explosives now listed in this class are nitrostarch explosives suitably modified to reduce the flame temperature.

Class 4.—In this class the characteristic ingredient is nitroglycerin. With the exception of the recently introduced gelatinized permissible explosives, the explosives in this class are not now used extensively.

Class 5.—Permissible explosives in this class contain ammonium perchlorate.

CLASSIFICATION ACCORDING TO POISONOUS GASES

Permissible explosives are also classified by the Bureau of Mines on the basis

of the poisonous gases evolved when they are detonated. Nearly all explosives when detonated produce a large volume of water vapor and carbon dioxide, but a less volume of carbon monoxide and sometimes hydrogen sulphide. Both carbon monoxide and hydrogen sulphide are poisonous gases and are liable to become a menace to the lives or health of the miners. In order to reduce this hazard the bureau limits the maximum quantity of poisonous gases that 1½ pounds of a permissible explosive can evolve upon detonation to 158 liters (5½ cubic feet). The volume of poisonous gases is determined by the bureau for each permissible explosive and on the basis of this determination it is placed in Class A if the volume is less than 53 liters, in Class B if less than 106 liters, or in Class C if less than 158 liters.

BLASTING EFFICIENCY

Permissible explosives have a wide range of strength characteristics, and a consideration of these makes it possible to select a suitable brand of explosive to meet any condition likely to arise in blasting. In addition to establishing the safety of explosives for coal mines in the presence of gas and coal dust, the bureau also determines the weight of a 1¼ by 8-inch cartridge, the unit deflective charge and rate of detonation.

UNIT DEFLECTIVE CHARGE

The unit deflective charge of an explosive is the best way to gage the "coal-getting" strength of a permissible explosive. The unit deflective charge is that weight of an explosive in grams which gives the same swing on the ballistic pendulum as 227 grams (½ pound) of Pittsburgh testing station standard 40 percent straight nitroglycerin dynamite. Figure 3 shows the ballistic pendulum of the Bureau of Mines.

Tests in coal mines have shown that if the charges of two explosives of otherwise widely varying characteristics are proportioned according to their unit deflective charges, they will bring down the same quantity of coal under similar conditions in a given coal bed. It might be well to show how this can be applied in coal shooting, by taking three explosives "A," "B," and "C," with a unit deflective charge of 245, 235 and 214 grams, respectively, also the weight of a 1¼ by 8-inch cartridge of 125, 170 and 185 grams, respectively. If we assume that explosive "B" is at present being used in blasting coal, the rib shot first fired requires three cartridges, which would weigh 510 grams. However, it is recommended that we use explosive "A," because it is claimed that as it is a less

dense explosive a better grade of lump coal will be produced. Before trying out the new explosive the most desirable charge to commence with should be calculated. By the ballistic pendulum test it has been found that 235 grams of explosive "B" is equivalent in strength to 245 grams of explosive "A," therefore it will be necessary to use a greater weight of the latter, or—

$$245 \times 510 \div 235 = 532 \text{ grams.}$$

Dividing by 125 the weight of one cartridge, we get $4\frac{1}{4}$ as the charge of "A" to be used. This charge should then be tried to see whether it will bring down the coal in a proper manner. If the coal is not shot down, then it will be usually found that the explosive is too weak; but, on the other hand, if the coal is brought down and shattered at the front of the cut, then the charge for subsequent shots should be reduced somewhat. An air-space is left around the cartridges in each case.

By a similar calculation, if it is proposed to use explosive "C," a charge of 2.4 cartridges will be required. In this case it will often be found that the coal is not brought down at the front of the cut, thus more explosive is needed, and this would probably be the cause of unduly shattering the coal.

Black blasting powder has a very high unit defective charge, but cartridges of this explosive have a higher apparent specific gravity than many permissible explosives other than the gelatinized type. Permissible explosives which have a low apparent specific gravity approach very closely in the defective strength of black blasting powder. The gelatinized explosives of high apparent specific gravity approach the defective strength of 40 percent dynamite.

The above considerations do not take into account the shattering effect of the explosive, which is usually gaged by the rate of detonation of an explosive.

RATE OF DETONATION

The rate of detonation of an explosive can be determined by the Mettengang recorder, shown in Figure 4. This instrument measures the rate at which the explosion travels through the cartridges when placed end to end.

Black blasting powder has a low velocity of explosion, about 500 meters a second. The rate of detonation of permissible explosives is 3 to 10 times the rate for black blasting powder. However, these variations do not affect the percentage production of lump coal to the extent that might be expected, because tests made in mines working in the Pittsburgh coal bed tend to show that under a given condition there is critical speed. Any rate greater or less than this critical speed will act adversely on the size of coal produced.

RECOMMENDED PRACTICE WITH EXPLOSIVES IN COAL MINES

Regardless of the brand of explosive used, tests have demonstrated the advisability of following out under close supervision the recommendations following:

1. Overhang of the face of the working place or of the ribs should be eliminated. This condition arises from the use of holes of insufficient depth, holes poorly placed, or both.
2. The cut must be of uniform depth and square at the corners.
3. All machine cuttings (bug dust) must be removed from the undercut before blasting.
4. Drill-holes should be placed according to a standard established for a particular mine or for a particular condition in the mine. Rib holes should be paralleled to line of sights and must not under any circumstances grip the ribs or be drilled on the solid.
5. All coal dust must be cleaned out of the holes before they are tamped.
6. Each type of hole should be tamped with a standard charge of explosive.
7. Holes should be tamped with incombustible stemming from the charge of explosive to the collar of the hole.
8. Shots should be fired electrically, one at a time, and usually the coal should be loaded out after each shot.

FEDERAL DOMINATION VS. STATE SOVEREIGNTY

(Continued from page 351)

The Supreme Court says so too, as may be proven by reference to the case of *Light v. United States*, in vol. 220, page 523, United States Reports. Although the United States holds lands as a private individual proprietor, it is not subservient to any state law in any manner and neither are its agents.

The original framers of our government tried to arrange the departments of government so that a judge couldn't make law and act as the executive all at the same time. But that has all been changed, as the Supreme Court said in a recent case: "Things must be viewed in the light of present-day experience and not by what was said an hundred years ago." How the United States ever managed to struggle through that hundred-year period will always remain a deep mystery. Certainly, they had the wrong ideas of government and never looked ahead at all; but the fact remains that the nation they built has withstood the shock of foreign aggression and internal civil war ever since its formation and is one of the great powers of the earth. Hence, what they said an hundred years ago must have amounted to something and must yet amount to something.

Some day there may arise a Moses willing to sacrifice himself on the altar of Americanism and who will lead us back to our real form of government. But whether he be a member of Congress, or a judge on the bench or in any other manner a government official, he had best lay out his plans so they may be consummated in the one term. That will be as long as he will last. The power of the government itself operating through its boards and commissions, having no postage to pay and all the free printing they require, and thousands of employees to travel about the country can defeat any public officer who combats them. Many a man in public office has stated, after a time, that the term of one man was too short to make any headway at all. Once in a while one hears of a member of Congress bewailing the fact that work in the governmental bureaus overlaps. For instance, nine separate and distinct bureaus have to do with public lands. Twelve or thirteen have to do with natural resources, and so on down the line. But in the end, Congress arrives at the precise place where it started. It is said that the east does not understand the west and vice versa, but that saying emanated out of a government department and is nothing but propaganda. With the instantaneous interchange of news, the perfection of highways and the automobile and the opening of the many airship routes across the continent, such rapid sayings as that quoted above fall of their own weight.

There should be neither east nor west nor north north south in this country and there will cease to exist such geographical lines when Congress and our courts are made to realize those facts.

FOURTH ANNUAL COAL OPERATORS CONVENTION

(Continued from page 343)

The real problem of the operating personnel of the coal mining industry is to secure lower costs through efficiency, and with maximum safety, and at a reasonable profit. The real purpose of these conventions and expositions is to enable the operator to do just that, by furnishing the medium through which an opportunity is given to get together for informal discussion of every day problems, thus obtaining safety, which is always first and paramount, efficiency which helps to eliminate waste, and the saving of thousands of dollars through interchange of ideas, and practical experience. They have proved themselves to be of great value to the industry.

Come to Cincinnati during the week of May 16, and join in this great co-operative movement.

AIMS AND ACHIEVEMENTS OF COAL CLEANING

Although Results Of Coal Cleaning Are Purely Relative And Do Not Create A Fixed Standard Of Quality, They Are, Nevertheless, Certain And Beneficial—Difficulties Of Cleaning—Mechanical Loaders An Important Factor

By RAY W. ARMS*

FROM an economic point of view the question of coal cleaning offers a large variety of aspects. Cleaning plants are expensive and require a certain addition to the unit cost of production of the coal. This additional expense must be thoroughly justified before the first cost of a cleaning plant is warranted. However, recent practice has tended more and more to add arguments favorable to coal cleaning.

The general tendency of the modern bituminous coal market is toward a demand for a variety of grades and sizes to suit the specific needs of the individual consumers. To produce these special grades, sizing and cleaning equipment fully as comprehensive and complicated as a manufacturing establishment is required. Due to this processing of the various grades of coal the producer is justified in asking and expecting an increased price for his product—in fact he installs his equipment in the first place with that definite expectation.

Unfortunately, however, unlike other manufactured products, the raw materials in the various coal fields are not uniform but in certain fields, more favored by nature, are so good that a competitor can not hope to duplicate their grade even by the help of the most expensive of preparation equipment. Compensation is found for this inequality in the fact that the freight rates on coal are such an important part of the price to the ultimate consumer that the marketing zone is limited, thus permitting the less fortunate producer to ship to districts where high freights prevent the use of fuel of a naturally higher quality.

An important modern tendency fostering the production of a multiplicity of grades of fuel is found in the increased research efforts of the combustion engineers. In the beginning coal was coal. It burned and gave off heat and that was about the story. Later it had to be coked to satisfy the needs of the metallurgical users and high ash was soon found to be a detriment. Nowadays, although high ash stands as perhaps the principal deleterious ingredient,



Tipple and Dry Cleaning Plant, Berwind-White Coal Mining Company, Windber, Pa. Capacity: Tipple, 540 Tons Per Hour; Cleaner, 400 Tons Per Hour

we have learned to beware of high sulphur, high phosphorous, low fusion temperature, low B. T. U. and, most recently, of those sizes of coal which are not adapted to the immediate purpose. Percentage of volatile matter is also often an important consideration.

As examples of this tendency we find that the householder wants a lumpy coal, partly to keep the dust down in the house and partly because that is the kind of coal he has learned to burn. Gas producers require uniform size and the correct percentage of volatile matter. Stokers require small sizes with a low ash fusion temperature and, in modern practice, with the very finest sizes or dust removed. By-product coke producers require a low ash, low sulphur, low phosphorous coal the size of which is not important as it is crushed before charging. This crushing is the result of the further complication that by-product coke is now usually made from coal mixtures in which crushing is preliminary to uniform mixing. Many other examples could be cited to illustrate the fact that fuel users have come to demand specialized products.

The alert producer therefore attempts to find the particular industries to which his coal is best adapted and prepares his coal according to their specifications. The manufacturer of coal preparation equipment must also recognize this tendency and so devise his process as to be easily adapted to the varying demands of the industry.

The clamor for low ash and low sulphur coal leads to much confusion regarding the type of cleaning equipment to be selected. Preliminary tests will usually show a slight advantage in favor of one process or another, but this usually is not a dependable indication owing to the difficulty of uniform sampling on limited tests. As the activity in coal cleaning increases it becomes more and more evident that the ash and sulphur reduction obtainable by various methods

of coal cleaning are practically equivalent. This is due to the fact that the possible ash and sulphur reductions by cleaning are more likely to be dependent on the character of the coal itself than on the process which treats it.

DIFFICULTIES OF CLEANING

Let us examine the difficulties which beset all cleaning processes regardless of whether they are wet or dry, confining ourselves for the moment to those processes which make a separation by using the difference in specific gravity between the coal and refuse materials.

The ideal situation from the point of view of the coal cleaning engineer is to be asked to clean a light gravity coal mixed with a bulky, heavy rock. In this situation almost any cleaning method will secure excellent results. This combination of circumstances is the exception rather than the rule.

One difficulty to be encountered is found in the shape of the particle. Coal is apt to be cubical in fracture whereas slate tends to break in thin, flaky pieces. This shape to a certain extent offsets the advantage of the weight of the piece and causes it to report in the coal where it is not wanted.

Another important aspect of all coal cleaning processes is the friability of the coal and the percentage of the material which is broken into extremely fine sizes. Inasmuch as the reduction of ash and sulphur is accomplished by the selecting and rejecting of individual particles of material the rated capacity of all devices on this fine coal is relatively very small, thus increasing plant and operating costs on coal containing a high percentage of fines. The quantity of accessory apparatus handling sludge recovery and dust collection is also increased by this fine coal.

By far the most universal and far reaching difficulty of coal cleaning is the presence of a quantity of material intermediate in specific gravity between coal

* Roberts and Schaefer Company, Chicago, Ill.

and rock. Into this classification fall the following:

1. *Bone Coal*—Coal with such a high inherent ash content that its weight is increased. The ash is so finely divided that it can not be separated by crushing.

2. *Light Slate*—Slate or shale may be rendered light in weight by being somewhat carbonaceous. There is no definite dividing line between this and bone coal but the degree of carbonization sometimes differentiates it locally.

3. *Laminated Coal*—Composed of thin layers of good coal separated by strata of bone or rock.

4. *Attached Pieces*—Coal to which a band of slate is attached, the bond being so strong that the piece usually breaks across the surface of attachment rather than along it.

5. *Pyrite Attachments*—Coal in which there is a streak of pyrite or a kernel of pyrite within. The specific gravity of pyrite is so high that but a very small attachment is required to place it in the intermediate class. A larger pyrite attachment will place a piece of good coal into the specific gravity class of the refuse.

The most abundant of these materials is the bone coal group and seldom is a coal seam so pure and uniform that it lacks a certain proportion of this kind of material.

The most significant factor in any coal cleaning problem is the amount of this intermediate material present. It is the most difficult material to separate owing to the narrowed range of specific gravity. Even if it would be separated completely the result is unsatisfactory as will be presently explained.

Let us assume as an example coal similar to the Freeport coal which may contain the following material classified from a coal cleaning aspect.

| | Pct. | Specific Gravity | Ash |
|--------------------------------|------|------------------|-----------|
| Good coal | 70 | Less than 1.35 | 7% |
| Bone & Laminated, etc. | 25 | 1.35-1.55 | 15 to 30% |
| Slate, etc. | 5 | Above 1.55 | 50% plus |

In order to clean this coal down to a 7 percent ash content it is evident that any cleaning process must reject 30 percent of the material even with perfect operation. But no cleansing process yet devised is able to duplicate the sink and float tests or "Washability Curve" and the more bone coal or intermediate gravity material present the farther is the actual performance removed from the theoretical. In the above example therefore in commercial operation the rejection must be still greater than the theoretical 30 percent to secure a 7 percent ash or, if this percentage of rejection is maintained, the clean coal will be contaminated by some of the higher



Pittsburgh Coal Company's Dry Cleaning Plant at Montour No. 10 Mine. Capacity, 325 Tons Per Hour

gravity material and the refuse will contain considerable coal.

Even if well done this sort of a cleaning operation is unsatisfactory. If this percentage of material is rejected the shrinkage in tonnage imposes a terrific expense upon the operation. If just the slate is removed to reduce the rejection the ash percentage in the clean coal is too high.

If sufficient outlet can be found for the high ash intermediate material a three part separation may be made, rejecting the slate and sending the intermediate or bone coal to a separate market. In certain cases this material may be split, taking the heaviest of the bone to the refuse and the lightest to the coal.

But in districts where coal prices are low it is doubtful if any producer can impose the burden of expense of a 30 percent rejection upon his mining cost and still sell coal in a competitive market.

The presence of a smaller proportion of bone or intermediate coal than is indicated in the above example is not so serious but it nevertheless constitutes to a reduced degree the principal difficulty of the problem.

MECHANICAL LOADING A FACTOR

Mechanical loading and mechanical cleaning are the latest pair of economic twins to be born upon an expectant world. Conceived of necessity, born in obscurity they, like Topsy, "just grew" to adolescence to be watched with mingled pride and skepticism as they struggle for activity. Twin like they depend upon each other for support and guidance; twinlike they feed each other and grow strong on each other's health; twinlike they will reach maturity together.

Mechanical loaders do not discriminate between rock and coal. They do not throw out partings nor do they cast aside roof or bottom. Hence mechanically loaded coal is usually much higher in ash than coal loaded carefully by

hand. It is therefore reasonable to assume that mechanical loading will only reach its full development assisted by mechanical cleaning.

AIMS AND ACHIEVEMENTS

In contemplating a cleaning plant it should be the aim of the producer to so fit the cleaning program into the scheme of things that the maximum benefit may be derived from the cleaning plant. Simply stated, the purpose of any cleaning plant is to produce a cleaner coal. This purpose is not sufficient in many cases to justify the expense of a cleaning plant without additional arguments to lend it force. The following statements include various aims and purposes which have been mentioned in the past as the reason for building or contemplating the erection of cleaning plants. They may include various points of view which have not as yet occurred to those individuals who are now faced with a cleaning problem. For this reason they are presented.

Producers furnishing coal to the general market including steam coal, domestic coal, railroad fuel, etc., may consider the following points:

1. The B. T. U. value of a coal is increased by cleaning. Various coals are improved in this respect to a greater or less degree depending upon the nature of the coal. Ordinarily the B. T. U. value is increased about 10 percent per unit of ash reduction.

2. Boiler efficiencies are increased. This item should be shown as a credit to coal cleaning in addition to the increase in B. T. U. as it is distinctly a separate item from the B. T. U. increase.

3. Freight rates are reduced by the percentage of material rejected assuming that the cleaning plant is located at the mine, as it should be.

4. The removal of ashes from the ash pits of boilers is less expensive.

4-A. Sulphur is reduced. Reductions in sulphur especially by dry methods cause indeterminate savings in reduced

corrosion to iron parts, railroad cars, elevating and conveying machinery, hoppers, grade bars, boiler tubes, economizers, etc.

The actual credit accruing to the cleaning process from this source is difficult to figure as the wear on grates and flues is considerably reduced by reducing the sulphur. It is difficult, however, to correctly evaluate this improvement.

5. The fusion temperature of ash is usually higher in the cleaned coal due to the reduction of pyrite. Consequently in many cases clinkering is less with a cleaned coal than a dirty one.

6. Foreign matter in coal ash reduces the combustibility of the coal and also its heat conductivity. Therefore, a low ash coal burns more freely with less production of smoke and soot.

7. Slate, shale and fire-clay occurring in removable refuse require considerable heat to drive off moisture and carbon dioxide. This heat must be obtained from the combustion of the good coal itself.

8. Very often small economies can be exercised in the mining when a cleaning plant is provided. These economies are possible when conditions permit of a relaxation of the efforts of the miners to produce clean coal below ground, thus putting the entire burden of the cleaning upon the cleaning plant. Very often in this connection coal which has been heretofore of non-commercial grade can be mined, cleaned and sold with the balance of the product.

9. Lump pickings may also, to a large extent, be salvaged by first crushing and then mechanically cleaning the coal thus released. This becomes a clear credit to the cleaning plant as this coal has already been mined and is otherwise a waste product.

10. Cleaning insures a uniform grade of coal. Inherent ash of any coal seam is usually uniform throughout the various parts of any one mine. Variations in ash occur by reason of the fluctuation in the quantity of refuse which can be eliminated. This uniformity is sometimes more important of steam if the proper conditions are maintained, but the change from one kind of coal to another destroys this condition and vitiates the result.

11. The heat loss due to unburned coal in the ash is approximately .5 percent for each percent of ash in the coal. This heat is sensible heat carried away in the ashes themselves. There is a loss also of unburned coal in the ash which is greater in high ash coals. A thumb rule which has been used by many combustion engineers establishes the equivalent ratio of 10 percent unburned coal in the ash with a 10 percent ash coal; 15 percent of unburned coal to the ash with a 15 percent ash coal, etc.

12. Frequently the removable dirt in nut and slack coal occurs in the coarser or nut size. If the nut is removed and cleaned it becomes a salable product at an increased price. By this process the finer slack has also been improved by the removal of the dirtier size and is salable as an improved slack coal.

13. Following this idea still further, any size which may be removed and sold as a special product will increase the realization on the entire mine output.

COKING COAL

Many of the items mentioned under steam and boiler fuel may be mentioned as economies when cleaned coal is used for the purpose of making coke. There is, however, an even more direct and immediate need of providing the coking plants with the best possible coal. The savings accruing to a coke plant may be listed as follows:

1. Slack coal may usually be purchased if cleaned instead of the higher priced run of mine coal usually adopted because of its low ash content.

2. All products from the coke plant, especially a by-product coke plant, are increased by the use of cleaned coal. This includes the coke, gas and other by-products.

3. Coke produced from clean coal usually has a better structure with the production of less braise and the higher percentage of furnace coke.

4. Sulphur is reduced in coke made from clean coal. This is of the highest importance in blast furnace practice.

5. The coking time of clean coal especially that cleaned by the dry process is reduced. This is important where it is desired to increase production of a coking plant without additional equipment.

In conclusion it may be stated that although the results of coal cleaning are purely relative and do not create a fixed standard of quality they are nevertheless certain and beneficial.

COAL-MINE FATALITIES

ACCIDENTS at all coal mines in the United States during the month of March, 1927, caused the death of 178 men, according to reports furnished by State mine inspectors to the Bureau of Mines. The production of coal during the month was 66,279,000 tons, of which 60,181,000 tons was bituminous and 6,098,000 tons was anthracite. Of the 178 fatalities reported, 139 were in bituminous mines and 39 in anthracite mines. Fatality rates based on these figures were 2.31 and 6.40, respectively, while the industry as a whole showed a rate of 2.69 per million tons of coal produced.

An explosion on March 30 at Ledford, Ill., caused the death of eight men. This is the first major disaster—that is, a

disaster causing the death of five or more men—that has occurred during the present year. During the first three months in 1926 there were seven major disasters, killing 189 men. The fatality rates based exclusively on these major accidents were 0.042 per million tons for 1927 and 1.201 for 1926.

MECHANIZATION ERA

(Continued from page 349)

the management believed that their system and methods had achieved some measure of success. This is not intended to imply that any mechanized mining operation which has been taken in the survey and described in the report is considered to have reached the stage where no further improvement is expected, in fact, just the reverse is true, and it is believed that further improvements will be hastened and the progress of mechanized mining will be accelerated by placing before the industry the ideas and methods of those who have already gained some successful experience. And the sum of these successful experiences is sufficient to justify the opinion that the time has now arrived when the statement that "Mechanized mining will never be used except in clean coal with good top" can be sent to join other once famous but now forgotten remarks, such as "The automobile will never be anything except a rich man's toy."

AMERICAN BLAST FURNACES LARGER THAN EUROPEAN

The superiority in capacity of American as compared with foreign blast furnaces has generally been recognized, but the extent is not common knowledge. A measure of this has lately been made possible from data prepared by the British Federation of Iron & Steel Manufacturers. Taking the furnaces in blast and the output for December, 1926 (January, 1927, being used for the British industry), the output of American furnaces was 494 tons per day. Following in order was 310 tons per day for German, 186 tons for the Belgian, 168 tons for the French, and 92 tons for the British. The American superiority is notable—at 494 tons per day it was about equal to the German and Belgian combined and was over five times that of the British. That rapid progress towards large furnaces has taken place in Germany is clearly indicated by the data, and it is something of a surprise that the Belgian capacity exceeds the French. In no other country has the use of large furnaces expanded as in the United States. In the face of this, however, it has been possible for some of the foreign producers to send iron to this country—whether at an actually lower cost or by dumping is not clear in all cases.

SHAKER CONVEYORS AT UNION PACIFIC COAL COMPANY

Automatic "Duck-Bill" Used In Connection With Shaker Conveyors In Driving Narrow Work, Straight Coal Extraction And Recovery Of Pillars

THE Union Pacific Coal Co. is operating seven Eickhoff M. R. and M. R. A. units, each of which is equipped with a "duck-bill" arrangement used in connection with shaker conveyors, designed by Mr. F. L. McCarty, superintendent of their Rock Springs, Wyo., mines.

Some of the units are used in driving narrow work, others on straight coal extraction and the recovery of pillars. On narrow work, at No. 8 mine, Rock Springs, driving up an 8-degree pitch, 42 feet has been driven, using an Eickhoff conveyor with a McCarty duck-bill, in nine consecutive hours (one shift plus one hour overtime). One unit, at No. 8 mine, Rock Springs, driving up the pitch, in the 11 shifts recently drove 214 feet. All of these places are advanced three cuts in each eight-hour shift, thus making the footage advance dependent upon the length of the cutter bar.

At the Superior mines of the Union Pacific Coal Co., conveyors were first used on long face work. Due, however, to the peculiar nature of the roof, and the tendency which the roof had to shear

By FRANK V. HICKS *

at the face for its entire length, necessitating heavy charges for timbering, and being very dangerous as well, after

Eickhoff M. T.-5 and M. T.-15 working in connection with the larger units.

A conveyor is simply what the name implies, viz, a means of transportation and whether their installation is justifi-

able as such, where coal has to be passed to them by hand, is largely a matter of local physical conditions, class of labor and wage scale.

By the application of some automatic feeding or loading device, such as the "duck-bill" on shaker conveyors, the conveyor immediately becomes a loading device and is applicable in some form in any coal seam of sufficient thickness to be now termed workable by hand loading methods, and it is safe to say that their installation will be found

having sheared, the long faces were abandoned.

Following the above experience a system of room and pillar mining was worked out for the Superior field which has proven to be very satisfactory from the standpoint of cost, safety and recovery. However, it is believed that this system can be improved upon by the addition of smaller units similar to the

to be economically justifiable.

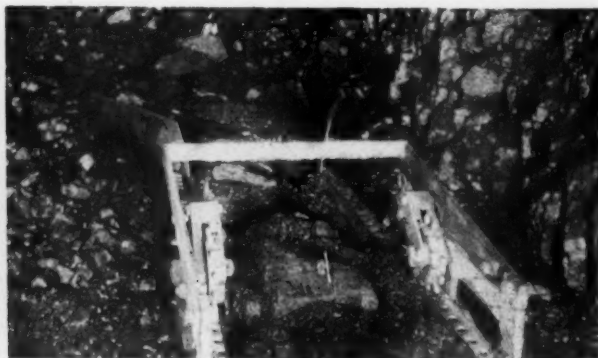
Production of smokeless coal, petroleum and gas from coal is to be undertaken at a plant to be constructed by the National Devonian Process, Inc., recently organized in Salt Lake City. A test plant is already working, carbonizing 500 pounds of coal in one operation. Present plans are to construct a plant with a capacity of 100 tons a day.



Operating Lever in Position to Advance McCarty Duck-Bill. Mine No. 8, Union Pacific Coal Co., Rock Springs, Wyo.



Operating Lever in Locked Position. Duck-Bill Ready to Advance Into Loose Coal



Operating Lever in Locked Position and Duck-Bill in Loose Coal Ready for Loading

* Engineer, Union Pacific Coal Co., Rock Springs, Wyoming.



METALS

PRACTICAL OPERATING MEN'S DEPARTMENT

GUY N. BJORGE, Editor

*Practical Operating Problems of the
Metal Mining Industry*



GROUP BONUS SYSTEM FOR SMELTER DEPARTMENTS

The Establishment Of The Bonus System At The United Verde Has Resulted In Increased Wages For Employees And Improvement In Mechanical And Metallurgical Methods — Bonus Standards For Smelter Department Difficult To Arrive At

THE United Verde Copper Co. started to use a bonus system at the Clarkdale Smelter in 1922. The first applications were in the shops on a small scale, but the system has been extended gradually until at the present time it has almost universal application in the shops, railroad, and the various operating departments of the smelter. The shop bonus is based on each job separately, the standard time allotted being estimated from past records, and time studies. The bonus may apply to one man or several, depending on the job.

The V. T. & S. railroad bonus is separated into three divisions, the shop bonus, which is similar to the smelter shop bonus, the operating bonus which is based on tonnage hauled, the standard being based on previous records, while the track maintenance bonus has a standard based on the previous cost of maintaining the right of way, tracks, etc. The operating and right of way are group bonuses, individuals of a group participating according to the percentage earned by the group for each particular month.

The bonus standards determined for the various smelter departments are much more complicated to derive because so many factors influence the results obtained in furnace or converter opera-

By C. R. KUZELL AND J. R. MARSTON *

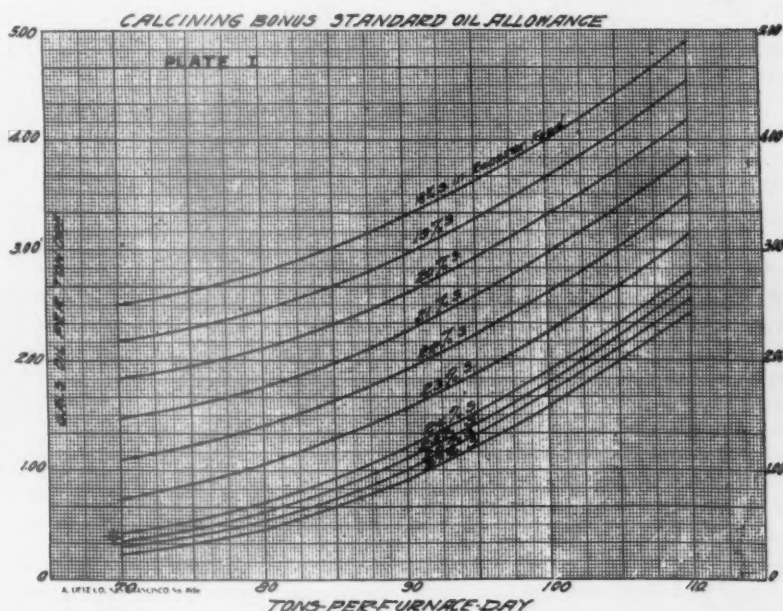
tions. The operating bonus is applied to groups and the method of arriving at the various standards in the various departments will be given in detail.

Unloading Ore—Standard: 23-1/3 man minutes per car.

Crushing Plant—Standard: 120 tons per man shift.

Blast Furnace—Standard: 26 2/3 tons per furnace per hour. Also, 1 percent bonus is paid for each 0.01 percent Cu. below 0.30 percent Cu. in the slag.

Calcining—The roaster feed carrying 24.5 percent sulphur with a roaster tonnage of 70 tons per furnace day requires but little extraneous fuel except to remedy some local condition which may develop, this fuel amounting to possibly



* Smelter Department, United Verde Copper Co., Clarkdale, Ariz.

0.25 gallons of oil per ton of feed. As the sulphur decreases or the tonnage increases more oil is required. The curves shown on Plate I represent the fuel allowed as the standard under various conditions of sulphur content and furnace tonnage. Since fuel is a large factor in the cost of calcining and as it is very easy to use more than necessary, the above curves are used as a standard and any saving which may be made is used as a bonus basis as follows:

From Standard Curves—

Gallons oil per ton feed..... 1.32

Actually used—

Gallons oil per ton feed..... 0.97

Saved—

Gallons oil per ton feed..... 0.35

The saving is 26.52 percent.

The men would get a bonus percentage of one-half of this percentage of fuel saving, or 13.26 percent.

In order to encourage saving on labor and repairs the oil bonus is combined with a cost bonus. A standard cost for operation is taken after deducting the cost of oil fuel and averaging the repair supplies over twelve months.

Then as example:

$$\frac{\text{Standard Cost}}{\text{Actual Cost}} = \frac{0.1600}{0.1361} = 117.56 \text{ percent performance.}$$

The men would get a bonus percentage of one-half of the percentage of cost saving or 8.78 percent.

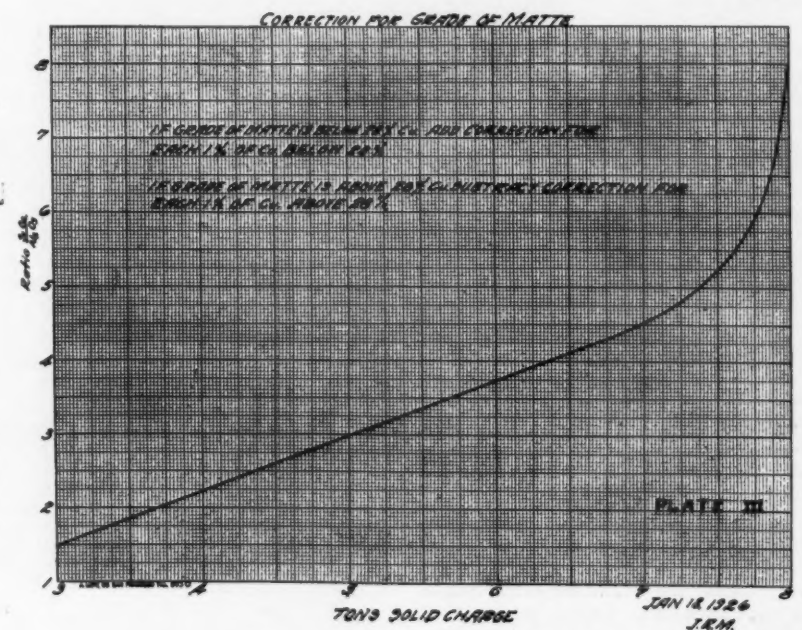
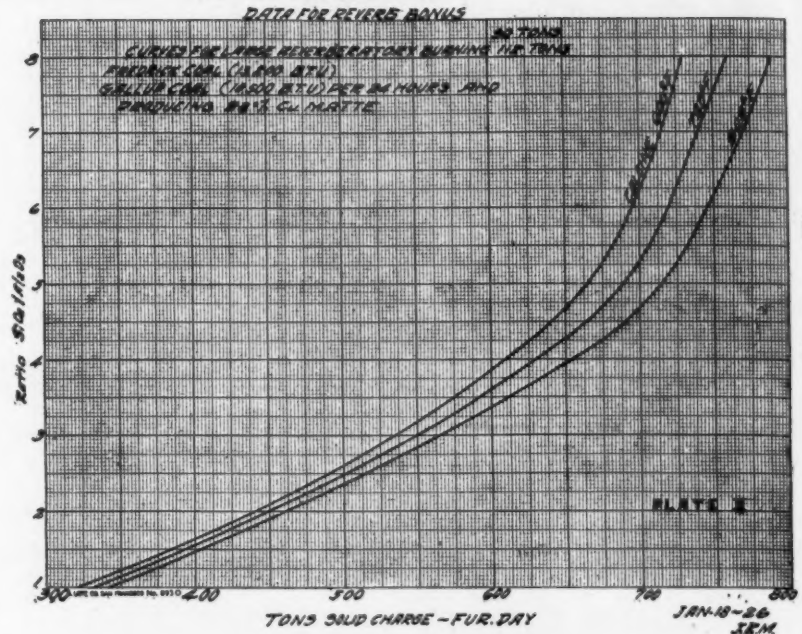
Actually the average of the oil and cost bonus is taken:

| | Percent |
|------------------|---------|
| Oil Bonus | 13.26 |
| Cost Bonus | 8.78 |
| Sum | 22.04 |
| Mean | 11.02 |

Therefore each man in the roasting department would get 11.02 percent of his wages for that particular month as bonus.

Reverberatory Furnaces—A reverberatory furnace will burn a certain quantity of fuel (within certain narrow limits) regardless of the charge, due to construction details, size, draft, etc. It has been demonstrated in practice that one of our large reverberatories (100 ft. x 25 ft. inside dimension) will burn, under best economy, 110 tons of Gallup coal of 10,500 B. T. U. or 90 tons of Colorado coal of 13,200 B. T. U.

The United Verde ore contains varying proportions of schist of the following approximate composition:

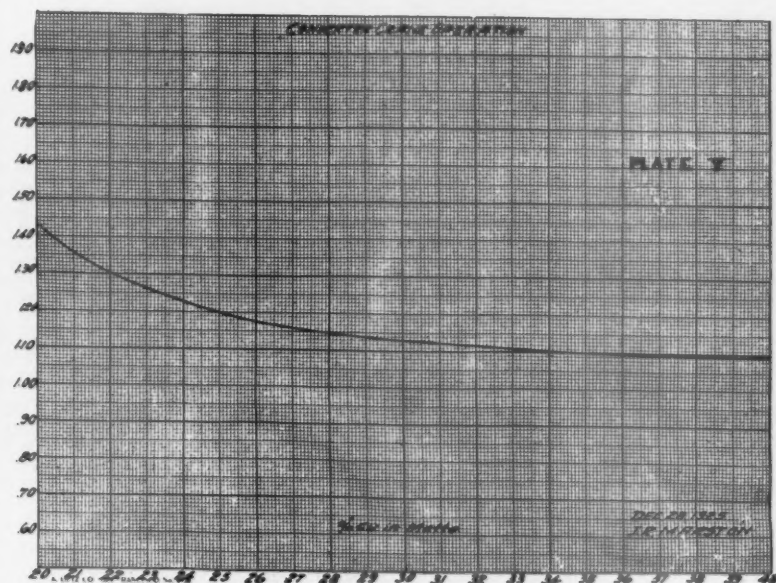
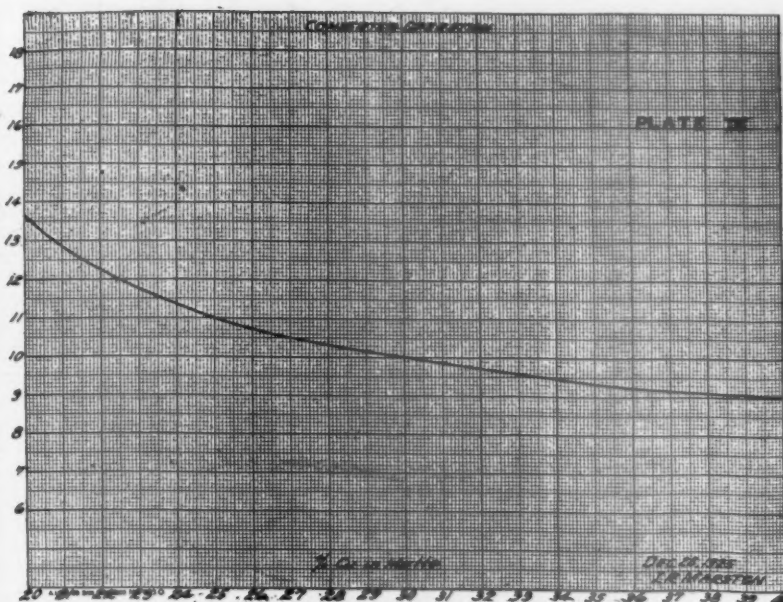


| | Percent |
|--------------------------------------|---------|
| SiO ₂ | 28 |
| Al ₂ O ₃ | 26 |
| FeO | 17 |
| MgO | 17 |
| CaO | 1 |
| Loss on Ignition | 10 |
| | 99 |

The presence of this schist in the charge increases the heat required in smelting in proportion to the amount present and since the furnace can take but a certain amount of coal the result is the reduction in the tonnage smelted. The tonnage is also influenced by the temperature of the calcine, the higher

the temperature the less furnace heat required to raise its temperature and more tonnage can be smelted. The grade of matte produced also affects the tonnage smelted. Low grade matte means more iron removed from the furnace and less slag produced, therefore the tonnage increases with the lower grade of matte.

Curves have been drawn (Plate II) showing the tons of solid charge smelted for variations in calcine temperature and ratio of silica to alumina (rather than the percent schist). A second curve (Plate III) shows the increase or decrease in tonnage as the matte varies from 28 percent Cu.



In practice the actual amount of fuel is corrected to the standard fuel and the tonnage also. It is assumed if the tonnage smelted is the same as that shown by the curves then the performance has been 125 percent and the men are allowed a 12½ percent bonus. Also they are paid 1 percent for each 0.01 percent Cu. below 0.35 percent in the slag. Since the furnacemen have control over the gases going to the waste heat boilers they are allowed an additional percentage of bonus equal to one-fifth of the bonus earned by the boiler room men.

Therefore total bonus paid all reverberatory men is:

Tonnage
Cu. in Slag.....
Waste Heat.....
Total.....

Converting Copper Matte—Matte contains Cu₂S, FeS, ZnS, FeO, and FeO. In order to reduce the matte to bullion it is blown with air to oxidize Fe, S and Zn and silica must be added to slag the FeO and ZnO. Since a low-grade matte requires more air for oxidation than a high one, also more silica to flux the FeO resulting, the actual measure of converting a certain grade of matte is in proportion to the amount of oxygen required. Curves have been constructed (Plate IV) showing the cost per ton of

copper for various grades of matte. This cost does not include crane operation, casting expense or loading. The cost of crane operation is shown in another curve (Plate V). In these costs the repair supplies have been averaged over twelve months.

In practice—

Converting Standard Cost \$11.2500

Actual Cost 7.8754

142.85 percent performance or 21.42 percent bonus.

Loading Bullion—Standard: 9½ tons per man shift.

Power House—The main work of the power house is to receive steam from the waste heat boiler plant and produce blast furnace blowing air, converter blowing air and electrical energy measured in kilowatt hours. It is assumed that steam is delivered at a certain price, repairs averaged over twelve months and the following standards adopted:

Cost of Producing

1,000 Cu. Ft. free air for Blast Furnace \$0.0025
1,000 Cu. Ft. free air for Converters 0.0090
1 K. W. Hour..... 0.0095

The standard cost divided by the actual cost gives the percent performance and one-half the amount above 100 is the percent bonus. The total bonus in this case is the sum of all three.

Waste Heat Boilers—Gases from the reverberatories are delivered to the waste heat boilers and the following standard of evaporation has been adopted.—Gross evaporation is lbs. water evaporated F. & A. 212° F. Per lb. coal burned at the reverberatories.

| Coal at 13,200 B. T. U. per lb. | Bonus percent |
|---------------------------------|---------------|
| 4.96 | 0 |
| 5.00 | 1 |
| 5.04 | 2 |
| 5.08 | 3 |
| 5.12 | 4 |
| 5.15 | 5 |
| 5.19 | 6 |
| 5.23 | 7 |
| 5.27 | 8 |
| 5.30 | 9 |
| 5.34 | 10 |
| 5.38 | 11 |
| 5.42 | 12 |
| 5.46 | 13 |
| 5.49 | 14 |
| 5.53 | 15 |
| 5.57 | 16 |
| 5.61 | 17 |
| 5.64 | 18 |
| 5.68 | 19 |
| 5.72 | 20 |
| 5.76 | 21 |
| 5.80 | 22 |
| 5.83 | 23 |
| 5.87 | 24 |
| 5.91 | 25 |

When oil is used it is converted to a coal basis.

In practice the actual evaporation is divided by the standard evaporation which gives the percent performance and one-half of the figure above one hundred is the percent bonus.

Many of the (continued on page 366)

SUPPLY DEPARTMENT PROCEDURE AT UNITED VERDE

Frequent Meetings And Close Contact Between Operating Heads And Supply Department Have Resulted In Splendid Spirit Of Cooperation, Making Possible Reduction In Warehouse Stocks, Without Hampering The Prompt Furnishing Of All Materials Required

A SUPPLY department is distinctly a service department. The total amount of service rendered in the supervision, storing and issuing of material and supplies should be founded on enthusiastic cooperation of the purchasing agent and the using departments, all of whose representatives should have an intimate acquaintance with supply department operations.

A storekeeper's first and most obvious duty is to provide material and supplies for the various departments requiring them. He is expected to meet any demands within reason and still not allow his stock to reach unreasonable proportions. To buy advantageously is good purchasing, but to carry excessive stocks is poor storekeeping. The maintenance of the proper balance in both departments is good management. Close contact between both departments is necessary.

* General Storekeeper, United Verde Copper Co., Jerome, Ariz.

By D. L. BOUSE *

sary in order that each proposition be weighed strictly on its merits from a broad company standpoint. In addition to the meetings between the purchasing and warehouse departments, the storekeepers and their staff should hold frequent conferences and ask users of supplies to make complaints, suggestions and recommendations as to the economic results derived from the material furnished them.

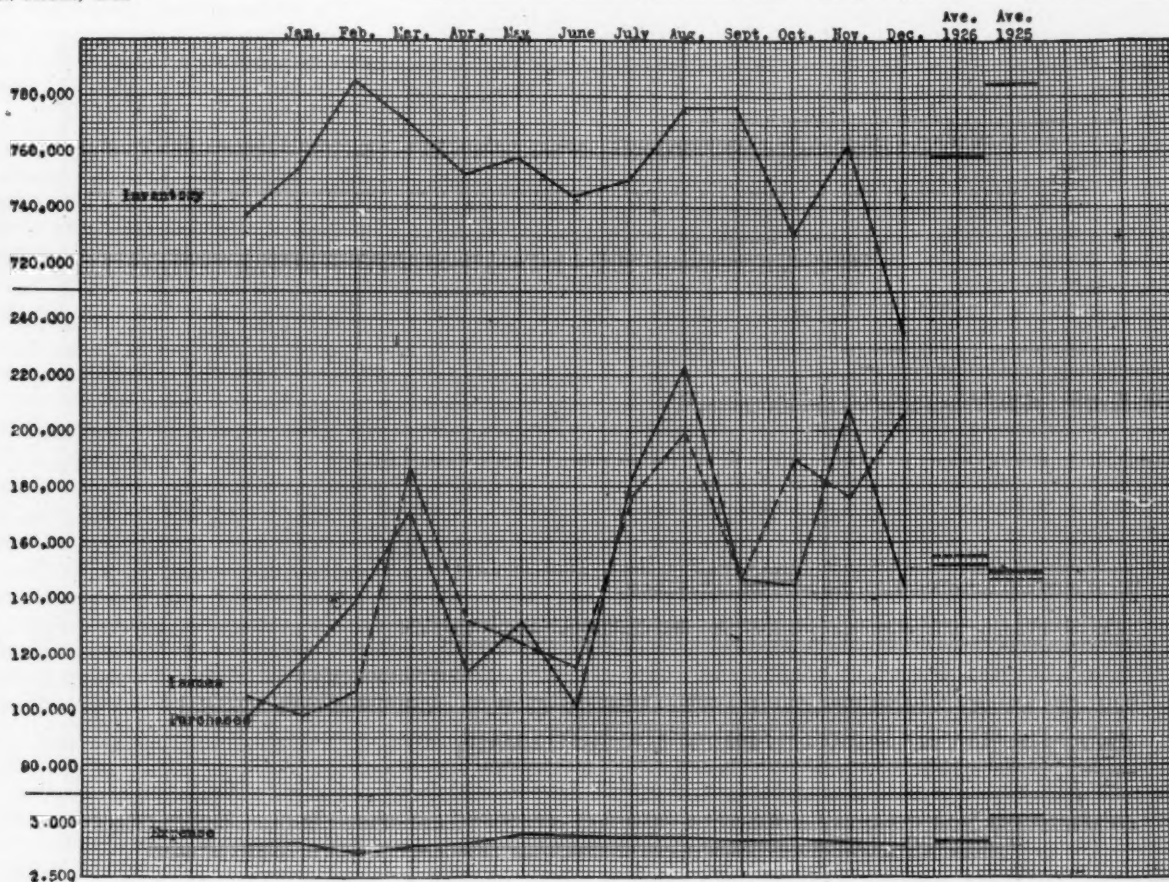
REQUISITIONS TO PURCHASING AGENT

Requisitions indicate how shipment is to come forward as to freight, express, truck, or parcel post; approximate date of delivery wanted; where to have goods shipped; approximate weight; approximate price to be paid (this information for the superintendent and general manager); for what use material is intended, and what constitutes an average

monthly supply. Then follows the description of the articles, quantity, unit, page and catalogue number from which the selection has been made.

The requisition is signed by the department head, manager of a subsidiary company, or by one of the storekeepers. Our purchasing agent refers to the general storekeeper all purchase requisitions which may be written by anyone so that the latter can see if there is anything in stock or in the salvage department with which he can fill the order. This plan is worked out conscientiously, and it is surprising how much material, such as left-overs from construction work or equipment which has been retired to the salvage department and reconditioned, can be used.

Upon receipt of our copy of the purchase order from the purchasing department, it is checked with copy of the original requisition and then filed for ready reference in alphabetical and nu-



Combined Supply Department Operations, 1925

merical order. Through a system of follow-up with the purchasing department, we are kept informed as to approximate date of arrival of the orders.

METHODS OF HANDLING WAREHOUSE STOCKS

Our system of handling warehouse stock is considered very simple and efficient, since there is nothing complicated or intricate in connection with any part of the storing or issuing of material. However, it is important that all of our work be accurately performed and recorded.

Upon arrival of material at either of our supply departments, a receiving clerk first checks the number of packages and weights, then tabulates this information on a receiving report form which gives the following information—Shipper, our purchase order number and date received, freight or express bill number or parcel post, and total weight. Each article is listed on this report with the individual weight, and remarks at the bottom of this form show just what items have been received and what ones are still en route.

When filled, this report is attached to the purchase order and passed to the invoice clerk who checks same against invoice. If there are any discrepancies in weight or amounts, or any damage of material in transit, a claim is filed immediately with our purchasing agent or with the manager of our traffic department.

All invoices are passed for payment by the general storekeeper's office to the accounting department, and the receiving report is the basis of our entire system of stocking material and paying for same. This has eliminated much "red tape" and we find it a big time-saver.

No material is put in stock until it has been properly tagged to show the name of the shipper, purchase order number, date and quantity received and, if special equipment, for what purpose and place it was purchased. The material is then stored in bins or compartments. The invoice is checked with the purchase order and receiving report for quantities and weights and with the freight book for amount of freight or express charges that have to be distributed against the various items. Stock tags are made out by the stock-record clerk who also makes the same entries on a set of receipt and issue cards. One advantage of this practice is that the same identical description is recorded on the stock tag as appears on the stock records, and with this correct information appearing on the daily issue tickets, there is no guess work as to what article was passed over the counter.

The Rand Visible Record system is in use, consisting of an issue card and a receipt card for each article carried in

stock. On the record card is written the purchase order number, firm name from whom goods were purchased, date of invoice, quantity received, total cost, unit cost, commodity, size and description, order point, maximum and minimum stock to be carried, location as to aisle, section and bin number. The issue card describes the commodity, size, date of issue, quantity, and the balance of material on hand.

All withdrawals from the supply department are issued only on a counter or department requisition which has been properly filled out and signed by the department head or foreman who has been authorized to order withdrawals. These slips show the article or material required, where it is to be used, the charge account number, and name of party ordering.

Each clerk's initials are required in filling an order so that we have a complete record of parties involved in each transaction. Also, clerks are required to see that all withdrawal slips are properly filled out and that the material required is correctly listed and agrees with the stock tag information previously described.

Each morning, the withdrawal slips for the previous day are priced out and recorded on the issue cards. As soon as the extensions and totals have been compiled, these tickets are sorted according to foreman making the purchases, and from these we write a daily report showing the entire withdrawals (Jerome and Clarkdale separate), and cost of same, by each individual foreman. This report also carries cumulative totals throughout the year, so that every user of material knows from day to day exactly what his withdrawals amount to in dollars and cents. These reports are mailed daily to the authorized users of material and in this way he keeps a very close check on material that has been charged to his department. Complete copies are also furnished to the office of the superintendents and general manager.

QUANTITY OF SUPPLIES CARRIED IN STOCK

The question as to quantity of supplies to carry in stock is one that requires very close study by everyone connected with this line of work and careful checking on the part of the men who fill orders from the floor daily, and by the stock clerks in keeping up the perpetual inventory records.

We aim to carry sufficient stock to meet our requirements as indicated on stock cards describing order point, maximum and minimum quantities to carry on each item, with the monthly or yearly turnover shown from the results of the year or six months previous.

Constant changing conditions and varying demands made upon our stock

items cause many revisions to be made from schedule, but our combined turnover of stock in the year 1925 was 2.277, and for 1926 it was 2.5, all of which would tend to indicate a healthy condition.

Considering the spare motors and expensive parts carried at all times to guarantee continued operation of the various departments, the above figures indicate a rapid turnover of standard supplies annually.

PROGRESS

From 1917 to 1922, owing to the unsettled conditions of war and high prices, very little thought could be given to the planning or management of stores at Jerome and Clarkdale. It was more a question in those days of being able to get delivery of material as per specifications and requirements.

In June, 1922, at the time this company resumed operations after a temporary shut-down, we began working to increase the efficiency of our stores department and endeavor to see what could be done to cut the cost of running a business which at that time seemed to be nothing more than a buffer between the management and the operating departments.

At the close of business, December 31, 1920, our combined inventories at Clarkdale and Jerome totaled two million dollars. Even with such a large investment, we always seemed to be short of the article required, with the result that orders were rushed through to the purchasing department, forcing it to buy on short notice at the expense of higher prices in order that the demands on us might be met and the work at the mine and smelter not impaired.

For several years we operated three separate supply departments, or warehouses as they were called, one at Clarkdale for the convenience of the smelter department, and two at Jerome; one for the mine, and one for the steam shovel department. Each store was in charge of a storekeeper with his various assistants and clerks, who were at the time responsible to the superintendent of that branch of the business.

On September 1, 1923, the steam shovel and mine supply departments were placed under one management, and the detail office work was consolidated into the mine division. Two years later, a further consolidation was made by placing a general storekeeper in charge of both Clarkdale and Jerome supply departments. His time is divided daily between Jerome and Clarkdale, and his duties require general supervision of material and supplies and to work with the various department heads in anticipation of their requirements.

It is due to the cooperation and support given us by the engineering departments, master mechanics and others, and through the existing harmony thus created, that we are in position at most all times to anticipate every requirement for material.

That benefits from the changes so far effected have been pronounced is illustrated by the reduction of investment in materials carried in stock. In 1920, our combined inventories, including warehouse stocks, fuel oils, coal and coke, lumber, brick and tile, pig iron and drill carbons totaled \$1,930,634.88. Inventories at the close of the year 1926, for the same stocks, totaled \$995,800.86, representing a decrease of stock during a period of increased production of \$934,834.02.

The policy of using obsolete material and cooperation in disposing of slow-moving material is a great factor in the reduction affected.

The cost of operating under the consolidated plan last year amounted to 1.827 percent based on total issues, and when based upon expense including payroll, auto trucks, locomotive cranes, shops and bonus paid, our saving for the year 1926 over 1925 was 12½ percent. We might add that this saving was made in spite of the fact that wages of men employed in this work were substantially increased.

SALVAGE

The supply department operates a salvage or reclaiming department which handles old material of all kinds, reconditioning all that is usable, and putting same back into service. Small electrical supplies, bolts, rivets, pipe fittings, and in fact everything that can be carried in our bins and on the shelves is tagged "Salvage" and is issued from stock as such in place of new material. As an incentive to keep up this policy, we distribute a monthly report to all departments showing the saving they have made to their departments and to the company in using reclaimed material.

At Jerome, the labor for this department is supplied by convalescent patients from the hospital who are fit for light work but have not been released by our doctors for underground work.

The underground foremen and their assistants keep the salvage department notified of surplus material, and aside from the use of salvaged material from the scrap pile and the mine, efforts are also made to decrease the volume of scrapped material.

As a by-product of the mining and smelting business, the reclamation and salvage deserves more than mere consideration. The results are not shown

by any fiction in accounting, since accurate records are kept.

Based on the difference in cost between material which has been salvaged and used instead of paying market price for same had new stock been used, our records for Jerome show savings to the company for 1923 to be \$9,800.00; for 1924, \$15,330.00; for 1925, \$28,339.00, and for 1926, \$40,576.00. At Clarkdale, we have only been keeping the record for a little over a year, but for the year just passed, with the opportunity to use thousands of dollars worth of reclaimed material in the construction of our new concentrator, the amount of salvage material used exceeded that of Jerome for the same year.

We are also working on a mercantile plan of bonus for a try-out in the supply department at Clarkdale with the idea of paying the counter men, who are working on day pay, a bonus every six months. This bonus earned will be based on issues of salvage material at 10 percent of the value of new material and must average more than \$200.00 monthly for the six months period, or, in other words, we must show a saving there of \$1,800.00 per month from salvage sales before any bonus can be earned. It is expected that these men will earn a 15 percent bonus above their day pay.

We do not operate a commissary department for the benefit of the company employes, with the exception of making a few sales of special material which can not be conveniently secured from the local merchants in the community.

Our company policy of trading at home is a big help toward keeping our inventories down, since quick delivery of supplies from industries of the southwest enables us to guarantee our operating departments full protection without being compelled to carry large stocks.

The cost of carrying our inventories includes much more than interest on investment. Insurance, taxes, handling and distribution, depreciation, and the possibility of machinery becoming obsolete, all have to be taken into consideration, so most of our time, outside of actual everyday routine is spent studying the possibilities of inventory reduction through simplification and standardization.

Frequent meetings and close contact between operating heads and the supply department, at which frank discussions of all problems are held, are largely responsible for the splendid spirit of cooperation that has made our supply department a SERVICE department.

In conclusion, it might be stated that

in any mining district such as this, a centralized warehouse system could be devised that would greatly reduce the total stocks carried and still afford the operator full protection. Failing in accord on such a program, a series of warehouses in such districts, under a single purchasing and warehouse organization, would undoubtedly greatly reduce stocks of material and operating costs with the same margin of protection.

GROUP BONUS SYSTEM FOR SMELTER DEPARTMENTS

(Continued from page 363)

standards were set when the price of power was 1.55 cents per k. w. hr., therefore power is corrected to this figure.

There are various other bonus standards as cleaning reverberatory flues and converter slag spouts based on bonus, and skull breaker, repair crews, oilers, etc., based on delay to machinery or equipment.

The bonus idea is based on the fact that any percent saving that can be made is divided equally between the company and the men, since there are no deductions if the men fail to make 100 percent performance. In other words their wages are guaranteed, and they are encouraged to greater efficiency, and in this respect is entirely different from piece work. The bonus system is a means to encourage more efficient and intelligent efforts among the men. The men benefit by an increased wage and the company benefits through the reduction in waste of labor, supplies and fuel.

The operating shift bosses participate in the group bonus of their department, but, as yet, the shop foremen do not participate since no satisfactory basis has been devised.

The average bonus earned per shift by the smelter operating departments during 1926 was \$0.85 and ran from nothing to \$1.98.

The bonus system has been satisfactorily worked out in most cases but is still undergoing further development, also as conditions change standards must be changed to meet improved metallurgical practice or more efficient equipment. Probably the greatest advantage derived from an analysis of such problems is the detailed knowledge that operating heads acquire when endeavoring to place a specific bonus on a specific operation. This frequently results in improved mechanical and metallurgical methods in addition to actual saving in operating costs.

PURCHASING METHODS AT THE UNITED VERDE

Purchasing Department Must Not Be Considered As A Separate Or Isolated Unit—Is Inseparable Part Of Any Organization, And Coordinated With Other Units Will Contribute Far-Reaching Results In Economical Operation Of Any Company

By DAVID HOPKINS*

THE purchasing methods used by the United Verde Copper Co. no doubt follow very closely the general practice as adopted by other institutions of a similar kind and character. The purchasing department, as its name implies, purchases all materials, supplies and equipment necessary to insure the continuous and economical operation of the various units of the company. In practice it cooperates and consults with the heads of the various departments to the end that the proper materials and correct supplies are specified, and that the best and most efficient machinery in conformity with the requirements is purchased.

The purchasing department must not be thought of as a separate or isolated unit, existing among an aggregation of units. It needs not only the suggestions and counsel of all department heads to develop its potentialities, but it is an inseparable part of any organization, and coordinated with the other units, will contribute far-reaching results in the successful, efficient and economical operation of the institution.

PURCHASE OF ARIZONA PRODUCTS AND SUPPLIES HANDLED BY ARIZONA JOBBERS

In conformity with the constructive program of the Arizona Industrial Congress, this company has given splendid support to the producers and manufacturers of the state in the disposition of Arizona products, and to the local jobbers handling products manufactured outside the state. Such movements as "Trade at Home" and "Use Arizona Products" have met with a receptive response.

The following list of yearly purchases manifests a decided partiality towards the use of "Arizona Products" and is a tangible demonstration of the support given the aims of the Arizona Industrial Congress:

| | 1923 | 1924 | 1925 | 1926 |
|------------------------------|--------------|--------------|--------------|--------------|
| Arizona products..... | \$326,590.86 | \$483,692.71 | \$478,777.26 | \$456,086.21 |
| Through resident agents..... | 185,791.74 | 450,114.56 | 425,457.94 | 417,259.14 |
| Total..... | \$512,382.60 | \$933,807.27 | \$904,235.20 | \$873,345.35 |

STANDARDIZATION

As an organization we are partial to standardization and simplification. Standardization makes easier the interpretation of requirements, the tabulation of competitive bids, and the assur-

ance of more prompt deliveries. However, not being a highly specialized manufacturing institution producing numerous articles of trade, it is doubtful whether it would prove profitable, in the final analysis, to adopt the multitude, or even a great many of the specifications covering the numerous articles purchased. The lack of uniformity in different specifications used by the various manufacturing institutions indicates that there is need for a master specification for all industries producing articles of a similar nature.

Dean Harvey, materials engineer for the Westinghouse Electric & Manufacturing Co., in substance, says: "Standardization is simplification in that it will reduce the number of materials used. Where there is no regard for standardization, there is an accumulation of a large assortment of materials of the same general properties, constituting an economic waste. Standardization will enable larger production at lower costs in that it makes for better manufacturing facilities, inspection and testing, smaller investments in equipment, and lower stocks of raw materials."

Thus, irrespective of price saving brought about by standardization, it would tend greatly toward convenience in purchasing, decreased outlay in capital necessary to provide storage and warehousing facilities, and reduction of inventories.

Mr. A. C. McLaughlin, vice-president of the Associated Oil Co. of San Francisco, in an address before the National Association of Purchasing Agents at Los Angeles last June, said: "True standardization of materials is the result of the proper adjustment of product to requirements. If we know accurately what we want, we can make to

meet that want, and we have all the data necessary to properly standardize."

From the standpoint of a company's welfare, nothing but good, profit, unity and cooperation can come out of any meeting or consultation that has for its subject and consideration the scheme of standardization. From a private stand-

point, a better personal understanding is secured, and a broader view of the other fellow's problems and what he is endeavoring to accomplish.

In the purchase of certain materials and equipment, this company insists that the items specified on order must be in accordance with certain specifications, such as:

Steel Castings—S. A. E.
Nickel Steels—S. A. E.
Nickel Chromium—S. A. E.
Structural Steel—A. A. S. M.
Boiler Steel—A. A. S. M.
Tank Plates—A. A. S. M.
Reinforcing Bars, Billet Steel, Concrete Reinforcement Bars—A. S. T. M.

COAL AND FUEL OIL

Slack coal, the principal fuel used in our reduction process, is bought on long-term contracts. It is purchased on a guaranteed B.T.U. content, as loaded on cars, at a basic price. Bonus and penalty clauses are written into the contract covering a plus or minus gain or loss over or under the B.T.U. guarantee, and payments are made at an agreed figure per 100 B.T.U.'s. The bonus and penalty factor is determined by the value of 100 B.T.U.'s per pound of coal at the mouth of the pulverized coal burners, and the agreement of B. T. U. determination is made in a manner similar to ore purchasing contracts.

Fuel and Diesel oil are purchased on contract covering as long a period as obtainable, but never less than a year's duration. The quality of the oil is the seller's commercial grade; the gravity, in degrees A.P.I. Gravity determination and correction for temperature are in accordance with A.P.I.

EQUIPMENT

Conveyor and elevator belts are purchased at present on the manufacturer's specifications, with particular consideration given to the construction, tensile strength of the rubber cover, weight of duck, tensile strength of both warp and filler yarns, and friction. Upon receipt of belting, samples are cut off for testing purposes and submitted to a testing laboratory mutually agreed upon. This laboratory carries out the tests on the foregoing characteristics in accordance with the methods approved by the United States Bureau of Standards.

In the purchase of power-generating, driving, locomotive, compressor, blowing, and initial equipment, the following practice is adopted:

* Purchasing Agent, United Verde Copper Co., Jerome, Ariz.

The engineering department, after consultation with the operating officials, writes the purchasing department, requesting price and delivery on specified equipment, stating the work to be performed, the conditions under which the particular unit is to operate, limitability of space, and other general and special information which will convey to the manufacturer a specific idea of the requirement, advising that nothing therein is to be construed contrary to the manufacturer's standard practice. Upon receipt of the request, the purchasing department prepares a formal specification, setting forth the wants and foregoing conditions. The formal specification carries with it an invitation to bid, and also seeks information as to terms and delivery. Calls are usually made by representatives of the firms invited to bid, and again the entire proposition with reference to operating conditions and requirements are thoroughly and completely scrutinized with the chief engineer. In many cases the proposals arrive in advance of the representatives, in which event a copy of the proposal, together with the manufacturer's specifications, if any, is referred to the chief engineer for consideration and recommendation.

When initial, large or expensive installations are contemplated, a conference is called, consisting of the general superintendent, superintendent, chief engineer, purchasing agent, master mechanic, and frequently the operating foreman of the department for which the unit is desired. A thorough and impartial discussion follows covering the merits and demerits of the article offered, its adaptability to conditions, changes in specifications, if any, its efficiency, refinements, construction, the materials entering into its construction, and, lastly, price. Following this general discussion, the various representatives are called upon individually to elaborate on the worth and excellence of their offering, to answer questions asked, and give information on any and every point desired. Upon completion of this phase of the transaction, the conferees express their opinions in private and, after further deliberation, decide which firm shall be given the business. This is not done, however, until all are in accord. After receiving the approvals of the chief engineer, executed on the specifications, and that of the general manager, on the proposal, the purchasing agent informs the successful bidder and proceeds with the consummation of the contract and order.

ORDINARY PURCHASES AND TREATMENT OF BIDS

In the purchase of ordinary warehouse stock in any quantity, the general storekeeper makes known his require-

ments on a standard form of requisition, used only in connection with the store-keeping and purchasing department. Whether the purchase calls for a small or large outlay, the requisition contains the signature of the head of the department requisitioning and the approvals for order of the general superintendent (in his absence the superintendent), the general storekeeper, and the general manager, if present. In the case of the latter's absence, approval is not required, but the general manager is at all times advised regarding orders calling for a large outlay of money.

Orders are placed direct for routine purchases, with the request that shipment be rushed. No direct orders are placed for sizable lots of material, unless it has been found from usage and experience that the material specified is the best adapted to our requirements. In the interest of sound purchasing, large orders demand that the purchasing agent seek price, information as to delivery, and ability to make delivery. When this information is tabulated the order is placed direct by the purchasing agent with the firm making the most advantageous proposition.

Purchases covering new installations, additions and expansions are made on bids. Bids are usually requested in triplicate and for the attention of the purchasing department. One copy is sent immediately to the chief engineer, who balances, if the article is a machine, the mechanical, economical and refinement features of one offering against that of another. Frequently the second copy of the bid is sent to the general superintendent's office for consideration along special lines of operation, experience and maintenance. When ready for final negotiations, a conference is called and proceeds as previously indicated. Following the conference, a letter of recommendation, containing the signatures of all conferees, is drafted, signifying what is believed to be the best and proper equipment to purchase, and the order is placed.

If the article desired is for standard material such as cement, reinforcing bars or structural steel, to be used in additions and expansions, the purchasing agent, after reviewing and tabulating the proposals, usually confers with the chief engineer, after which the order is placed.

It is our policy to treat bids in a private and confidential manner whenever possible. Not being a public concern, we feel no obligation to make known the figure of a successful bidder. It is believed that promiscuous publicity of such figures would have an unhealthy and harmful influence on clean-cut competition, would destroy confidence, and would be unethical in practice.

DUTIES AND GENERAL DETAIL

It devolves upon the purchasing department to keep a correct and accurate record of orders and prices; a simple, accurate and accessible filing system; to study business conditions and markets; to assist in acquainting the operating and engineering departments with new material and equipment which comes to notice; to establish relations with dealers and to seek out new and reliable sources of supplies; to help keep down material inventory; to interview salesmen and place them in touch with the operating and technical men; to endeavor to attain "permanence in purchasing confidence," and to subscribe to the principles and purchasing practice advocated by the National Association of Purchasing Agents.

The general detail involves the keeping of an accurate record of orders, both current and completed. The current record is made of loose-leaf ring binders, sufficiently large to take order sheets 8½ by 11 in. These orders are filed both alphabetically and numerically until such time as completed. They are then transferred to other loose-leaf binders until the year's orders are completed. From these binders the orders are again transferred to an inexpensive post binder which constitutes the permanent record of orders.

A price book is accurately kept, into which purchases are entered. This book contains a record of the order numbers, from whom ordered, quantity, a short description of the article, invoice date, trade discount, cash discount, first cost and cost at works, freight bill number and date. This is, in fact, a ready reference embodying the most important details of a negotiation and, if accurately kept, enables the department to furnish detailed information covering purchases of more than 20 years' standing.

Invoices are requested in quadruplicate, one copy of which is retained in the files of the department. The original and two copies, upon which are recorded information as to point of purchase, freight allowances, if any, terms, and approval as to price, are forwarded to the general storekeeper. Upon receipt of the invoices by the general storekeeper, other information necessary to conform with our system is recorded and the invoices passed to the accounting department for payment in accordance with the terms noted by the purchasing department.

A fairly complete catalogue library is maintained and is at the disposal of any employee of the company. Immediately upon receipt all catalogues or treatises of a technical nature are placed in the hands of those interested and then filed for future reference.

(Continued on page 370)



Type of Electric Shovels and Locomotives to Be Used by the Anglo Chilean Consolidated Nitrate Corp., at Coya Norte

MINING NITRATES WITH ELECTRIC SHOVELS

Description Of System Of Mining To Be Inaugurated By Anglo Chilean Consolidated Nitrate Corporation, Which Includes First Attempt In History Nitrate Production To Use Power Shovels

FOR the first time in the history of nitrate production on the Chilean desert, power operated shovels are to be used on a commercial scale for stripping the over-burden and for mining the nitrate-bearing rock. This will be done by the Anglo Chilean Consolidated Nitrate Corporation which is now building a plant at Coya Norte. This plant is to be located at the mines on the Chilean Pampa, about 5,000 ft. above sea level and 40 miles inland.

One of the first steps will be the partial electrification of the railroad running from the seaport, Tocopilla, to the mine. This is now a steam road and is owned by the corporation. It was constructed about 40 years ago, is very crooked and follows the contour lines of the mountains. Fresh water for the steam locomotives is obtained by distilling sea water. The boilers are fired by fuel oil.

The present plans call for the electrification of the heavy grade section of the railway only. Power will be secured from the plant located on the desert and will be transmitted by a three-phase, 60-cycle transmission line at 33,000 volts. There will be two automatic railway substations, each containing two 750-kilowatt synchronous motor generators and automatic switchboard control for convert-

ing the 33,000-volt power to 1,500 volts direct current.

Existing rolling stock is being brought up to date by the installation of automatic couplers and air brakes. Trains will be handled initially with 60-ton (metric) locomotives of the General Electric type B-B. These will be arranged for multiple-unit operation and later, as traffic increases, trains will be double-headed. The locomotives will be provided with regenerative braking for controlling the speed of descending trains without using the air brakes. With steam operation the item of brake shoe and tire wear is considerable. The locomotives will receive power from an overhead copper trolley wire supported by means of standard catenary construction.

The two railway substations will be fully automatic and directly under the control of the train dispatcher by means of the General Electric supervisory control system. It is the intention to dispatch the ascending and descending trains in such a manner that full advantage of regenerative power will be obtained. Good economies are anticipated through reductions in brake shoe and tire wear and the saving in power.

As the ore is mined it will be handled by six model 100-B Bucyrus full re-

volving shovels. Each shovel will have a dipper capacity of three cubic yards and will be driven by a motor generator consisting of a 190-horsepower motor and three generators having a total output of 150 kilowatts to the three main motors on each shovel. Alternating current supplied to the driving motor of the motor generators will be changed by them to direct current to operate the shovel motors.

The ore will be loaded by the shovels into trains pulled by electric locomotives. There will be thirteen 30-ton combination trolley and storage battery type locomotives for this purpose, one of which is to be equipped with side-arm trolley for use at a later date, and all of which will have both pantograph and third-rail shoes. These locomotives will be used on 500-volt trolley and 190-volt battery service, 42-inch gauge track. The majority of the locomotives will be used in hauling the ore from the workings to the mill where it is treated. Others will haul the waste to the dumping loop.

The tracks to and from the workings will be permanent and arranged for trolley service. Operations will be handled in a loop, there being a number of cross-overs through the mine proper to the return side of the loop. These cross-overs, occurring at intervals, will



Panoramic view at Coya Norte. The fill at each side carries movable towers with cableway. All construction materials are handled via this cable. There are no derricks. The construction colony is in the left background. In the

center are the leaching vats, 1,600 feet long. In the background are the unloading bridges for removing tailings with clamshell buckets. The power station is shown in the background to right. Elevation about 4,600 feet

have temporary tracks as they will be constantly shifted as the shovels move along into the bank. It is over this temporary track that the locomotives will operate on the storage batteries.

POWER EQUIPMENT

Power for the locomotives at the mining operations will be supplied by three motor generators in the main power house, each nominally rated 300 kilowatts, 600 volts and driven by 435-kv-a., 2,300-volt, 60-cycle synchronous motor with a 5-kilowatt, 125-volt, compound wound exciter. The three sets will have complete automatic control. Each will be started and stopped by means of a remote control switch located at the main switchboard. The control will be so arranged that the load will be automatically balanced between any two or all three of the generators.

The mining loop will be equipped with a 1,500-ampere automatic d-c. feeder, and the waste dump loop with a 1,200-ampere automatic d-c. feeder. The usual protective features will be included.

There will be a battery charging equipment for the storage batteries on the locomotives, and a balancer set rated 300/600 volts will provide 300 volts for charging. The charging board will consist of one incoming line panel, one balancer panel and 15 charging circuits for modified constant potential charging. The direct current for charging will be obtained from the motor generators in the main power house.

Approximately 23,000 feet of 2,300-volt, a-c. transmission and approximately 40,000 feet of 600-volt, d.c. transmission will be constructed. The poles used will be of the Truscon type, 30 feet high, made of galvanized steel. On part of the waste dump loop track a special type of Truscon pole will be used, enabling the pole and line to be moved easily as the dumping face is extended. Each pole will be attached to a section of track and, as the line is to be moved, the track sections and poles will be moved at the same time, thus keeping the trolley always above the center of the track.

Where the waste dump trucks run beside the leaching vats it would be impossible to use any form of trolley construction and this part of the track, for a distance of 1,600 feet, will therefore be provided with third rail. The rail will be of special construction and well shielded to protect it against the dripping salt solution. An automatic sectionalizing switch will connect the third rail to the trolley.

When the voltage of the system falls below a certain predetermined value, the voltage will be boosted and power factor improved automatically by means of a synchronous condenser. This will be located at the end of the 2,300-volt line and will be rated 500 kv-a., 2,300 volts, 3-phase, 60 cycles. The automatic con-

trol will be so arranged that the condenser will be started on low voltage and will then maintain approximately normal voltage at the end of the line. The condenser will automatically shut down on light load. The automatic control will include features enabling the station to start and stop automatically and operate unattended.

Rail bonds will be welded with a portable arc welder consisting of a Buda 4-cylinder, 22½-horsepower gas engine driving a 200-ampere, 25-volt generator. This unit, with its control panel, will be entirely self contained and will be equipped with roller bearing running gear.

The shovel circuits will be connected to the main line through line connectors and outdoor type oil circuit breakers which can be easily moved as the work progresses.

Practically all of the electrical equipment for the project is being furnished by the International General Electric Company, including the locomotives, transmission, substations, electrical equipment on the shovels, the majority of the industrial motors, etc. Power will be generated by Diesel engine driven generators, the generators and switchboard being of European make.

PRODUCTION OF BAUXITE IN UNITED STATES IN 1926

THE production of bauxite in the United States in 1926 was 392,250 long tons, valued at \$2,415,200, an increase of 24 percent in quantity and 21 percent in value, as compared with the domestic production of 316,540 long tons, valued at \$1,988,250, in 1925, according to a statement prepared by James M. Hill, of the Bureau of Mines.

The production of bauxite in the Arkansas field was 371,570 long tons in 1926, an increase of 25 percent as compared with 1925. The eastern field, including Georgia and Tennessee, produced 20,680 tons, an increase of 2 percent as compared with 1926. No bauxite was produced in Alabama or Mississippi in 1926.

The following is a statement of domestic bauxite sold by producers to industries in 1924 to 1926, inclusive, in long tons:

| Year | Aluminum | Chemicals | Abrasives, refractories, cement | Total |
|------------|----------|-----------|---------------------------------------|---------|
| 1924 | 225,780 | 54,870 | 66,920 | 347,570 |
| 1925 | 173,040 | 67,420 | 73,980 | 314,440 |
| 1926 | 241,850 | 77,960 | 72,440 | 392,250 |

Domestic bauxite was quoted throughout the first half of the year as follows: Crushed and dried, \$5.50 to \$8.50; pulverized and dried, \$14; calcined and crushed, \$17 to \$20 a long ton, f. o. b. shipping point. Beginning with August quotations were changed to read: "No. 1

chemical ore, over 60 percent Al_2O_3 , less than 5 percent SiO_2 and less than 2 percent Fe_2O_3 ," and the price quoted was \$8 a ton f. o. b. Georgia mines the balance of the year. Domestic producers reported value f. o. b. shipping point at \$5 to \$8 a ton, the average for the whole domestic production being \$6.16 a long ton.

Imports of bauxite in 1926 amounted to 281,644 long tons, valued at \$1,187,497 (an average of \$4.22 a ton), a decrease of 20 percent in quantity as compared with imports in 1925. Imports were chiefly from the Guianas and Dalmatia, though some French bauxite was imported. Imported bauxite is used chiefly by the chemical and cement industries on the eastern seaboard.

PURCHASING METHODS AT THE UNITED VERDE

(Continued from page 368)

CONCLUSION

Purchasing has long since been recognized as a profession—not a trade—and as such the high ideals and standards advocated by the National Association of Purchasing Agents have been adopted by its members as the gospel of ethical conduct in daily dealings with the seller.

Secretary of Commerce Hoover, before the twenty-first convention of Advertising Clubs of the World, on May 11, 1925, held in Houston, Tex., said in part: "But the milestone which will mark the passage from a trade to a profession is the establishment of group ethics. The group characteristic of law and medicine and engineering is not alone the training of skill required; it is the elevated code of relations with fellowmen; the incorporation of responsibility to the community into the daily task; the insistence upon a high sense of service given that makes their distinction, and the vigilance agencies which we have set up to protect ourselves and the vendor, are the finest proofs that the profession of purchasing is moving or evolving toward highly ethical standards."

Operating four years without one disabling accident is the remarkable record at the Albany mine of Pickands, Mather & Co., three miles east of Hibbing, Minn. During this time a great deal of dangerous work was completed. Over 500,000 tons of loose rock were removed where it was necessary to operate against a 40-foot bank with standard railroad-type shovels, half of the work being done on night shift. A unique scheme of flood-lighting the pit was installed in addition to floodlights on the shovels, and this illumination proved so satisfactory for both safety and efficiency that it has been adopted by other pits on the range. The annual shipments average about 200,000 tons.

THE NATION'S VIEWPOINT

A Digest Of The Expressed Opinions Of Leaders In American Affairs

OGDEN L. MILLS, Assistant Secretary of the Treasury, in a recent address, stated that the corporation tax rate is out of line and calls for remedy. Mr. Mills says:

"I am not speaking so much from the standpoint of the corporations which, on the whole, appear to be prosperous; though, if we include taxes paid states and local units, they are certainly bearing a heavy burden. In 1923, for every dollar paid stockholders, the various governments received 62 cents. But I am, speaking from the standpoint of the small stockholder of moderate means, and of the stockholder of moderate means even if his stock holdings in a small corporation are large. The matter is of real importance because of the present widespread investment in corporate stock on the part of millions whose income is strictly limited.

"Falling, as their income does, in the lower brackets, they would not be taxed were it derived from personal exertions, from real property or from other sources, at more than 1 percent or 2 percent; but, through the corporation their proportionate share in the income of the latter is now taxed at 13½ percent. Formerly, when the normal tax rate and the corporation rate were the same, the exemption of dividends from normal tax took care of this situation. But this is no longer true. * * *

"Under modern conditions, and with the growth of the country, the cost of government everywhere shows a constant upward tendency. Just to maintain the existing level, requires unremitting industry and a constant effort to absorb the cost of new activities by better and more economical methods of administering all of the governmental business. To grasp fully the significance of what has been accomplished along these lines in Washington, you have but to compare the record there with those of our own state and city governments. * * *

"The real tax problem of the

country is no longer in Washington, but in the state capitols, in the city halls and county seats throughout the country. Turn your eyes homeward. Much remains to be done there."

In the opinion of Charles D. Hamel, General Counsel for the Joint Congressional Committee on Internal Revenue Taxation, the first efforts of the committee should be to determine just what provisions of the existing law and modes of administration are objectionable to taxpayers or to the Treasury Department. Mr. Hamel believes it is essential to the success of the committee's efforts that its work be carried forward constructively, with the sole purpose or aim of making a better revenue system for the future. The plan submitted by him to the committee for making a survey of the revenue system sets forth the following questions and comments:

"1. The interest provisions. In this field it should not be difficult to formulate principles. The work is likely to lie along lines of legal questions and certain administrative difficulties.



Wallace Press-Times.

Company's Comin'

"2. The limitations provisions. The questions here are largely legal and should be taken up by the counsel at the earliest practicable date.

"3. Installment sales. A most vexatious problem from the standpoint of the Treasury and certain classes of taxpayers in recent years has been the taxation of installment sales, particularly with reference to double taxation. Careful inquiry should be made to ascertain whether the present system is satisfactory.

"4. Capital gains and losses. It is understood that there is doubt whether the revenue from capital gains and losses justifies the retention of this provision in the law. A comprehensive analysis of the facts is a prerequisite to any consideration of the problem.

"5. The Board of Tax Appeals. Speaking broadly, the Board has undoubtedly given satisfaction to taxpayers. Certain questions relative to the volume of appeals, the capacity of the present organization to handle more expeditiously the large number of cases brought to it, the simplification of statutory provisions relating to the Board, and other questions should be studied by the counsel.

"6. Reserves. Under the present law, certain taxpayers are permitted to deduct additions to reserves for bad debts. A few other reserves are recognized with reference to particular classes of taxpayers. It has been contended that certain kinds of reserves set up to meet future obligations should be deductible, though no payment is made, and no legal liability incurred within the taxable year.

"7. An act or code of tax administration. The committee, I think, should consider the feasibility of drafting what may be called a 'Code of Federal Tax Administration' apart from the revenue acts. If practicable, this field seems to offer interesting possibilities in the way of simplification.

"8. Earned income credit.



© Chicago Tribune.

*They've Got to Quit Tying Cans to
Our Trower's Tail*

This provision, designated to recognize the difference for tax purpose between earned income and investment income has not been well understood by the public. Some change may be necessary.

"9. Reorganizations. The law is not so clear as it should be, and there are some other objections to the present provisions. The study of simplification and correction should be undertaken."

In order to secure as wide cooperation as possible from taxpayers and others interested in the simplification and improvement of the income tax system, Mr. Hamel outlined for the consideration of the committee the following plan of procedure:

"I suggest that the committee first secure the facts from the viewpoint of taxpayers by mailing, as soon as practicable, appropriate letters requesting the submission in writing at an early date of specific criticisms and suggestions. Among others, such letters should be sent to the trade associations, national, state, and local chambers of commerce; boards of trade; economic associations and agencies; national, state, and local bar associations; societies and associations of accountants; well-known economists and students of taxation; members of the bar and others who have specialized in this practice; business schools; financial and economic journals; individual and corporate taxpayers; and perhaps to a selected group of business executives. Doubtless the press would give full publicity to such requests for criticisms and suggestions on revenue matters. The fact that a large part of the replies might not be of much ultimate helpfulness and that many would be written from considerations perhaps of self-interest should be recognized

as necessarily involved in getting the viewpoint of taxpayers.

"It will not be difficult to compile immediately a mailing list which should bring us the views of practically all lines of business on tax matters, and also the views of the best informed students of taxation and tax counsel. The answers should enable the committee to judge accurately the objectionable features in the law and also the degree and scope of the objections. It would then be in a position to study specific problems intelligently and to benefit by the practical suggestions offered, which would come in many cases from those who have actually participated in the matters discussed by them.

"Conversely, I think the Treasury Department should be asked to compile and submit to the committee, in writing, as soon as it can detailed statements of its views, with recommendations for such changes in the law and administrative practices as it may see fit to suggest. Further, the department should be asked to prepare written statements of its views from time to time on matters under the consideration of the committee, as hereinafter outlined.

"In most instances, I think, the committee would benefit also by asking the department to express its views on the principal objections raised by taxpayers. I am sure we can obtain full cooperation from the Treasury. The committee should avail itself fully of the accumulated experience of the department.

A memorandum on dumping has been submitted to the Department of State by Jacob Viner, professor of political economy at Chicago University, for the use of the American delegation to the International Economic Conference to be held May 4 in Geneva. "Dumping" is referred to as sales for export at lower



Wallace Press-Times.

A Chaser

prices than those charged at the same time and in the same circumstances to buyers in the home market. Professor Viner states that dumping has never been as prevalent in international trade as at the present moment, particularly in industrial countries where there are tariffs, and in countries whose industries have been organized into trusts or cartels. He cites the following reasons for the practice of dumping by exporters:

1. The necessity of disposing of surplus stocks.
2. The desire to develop or keep certain foreign markets.
3. The desire to increase sales in order to reduce the cost of production.
4. The possibility of selling for export at a profit, but at a lower price than at home, where the goods are protected by tariff.
5. The necessity of driving a competitor out of a foreign market or of protecting himself against predatory dumping by selling at a loss.

"The most logical anti-dumping provision is one which provides for special duties on imports sold at dumping prices equal to the excess of the foreign home over the export price. In comparing foreign home and export prices to ascertain the existence of dumping, allowance should be made for any significant difference, as between export and domestic sales, in size of order, credit terms, quality of goods, type of packing, place of delivery, etc., which may either justify an existing excess of the foreign home over the export price, or may make the export price, in fact though not in appearance, lower than the foreign home price. The time of comparison should be the same for both prices, and should preferably be as of the date of the sale rather than either the date of exportation or the date of entry at the customs house of the importing country."



Wallace Press-Times.

The Shock Absorber

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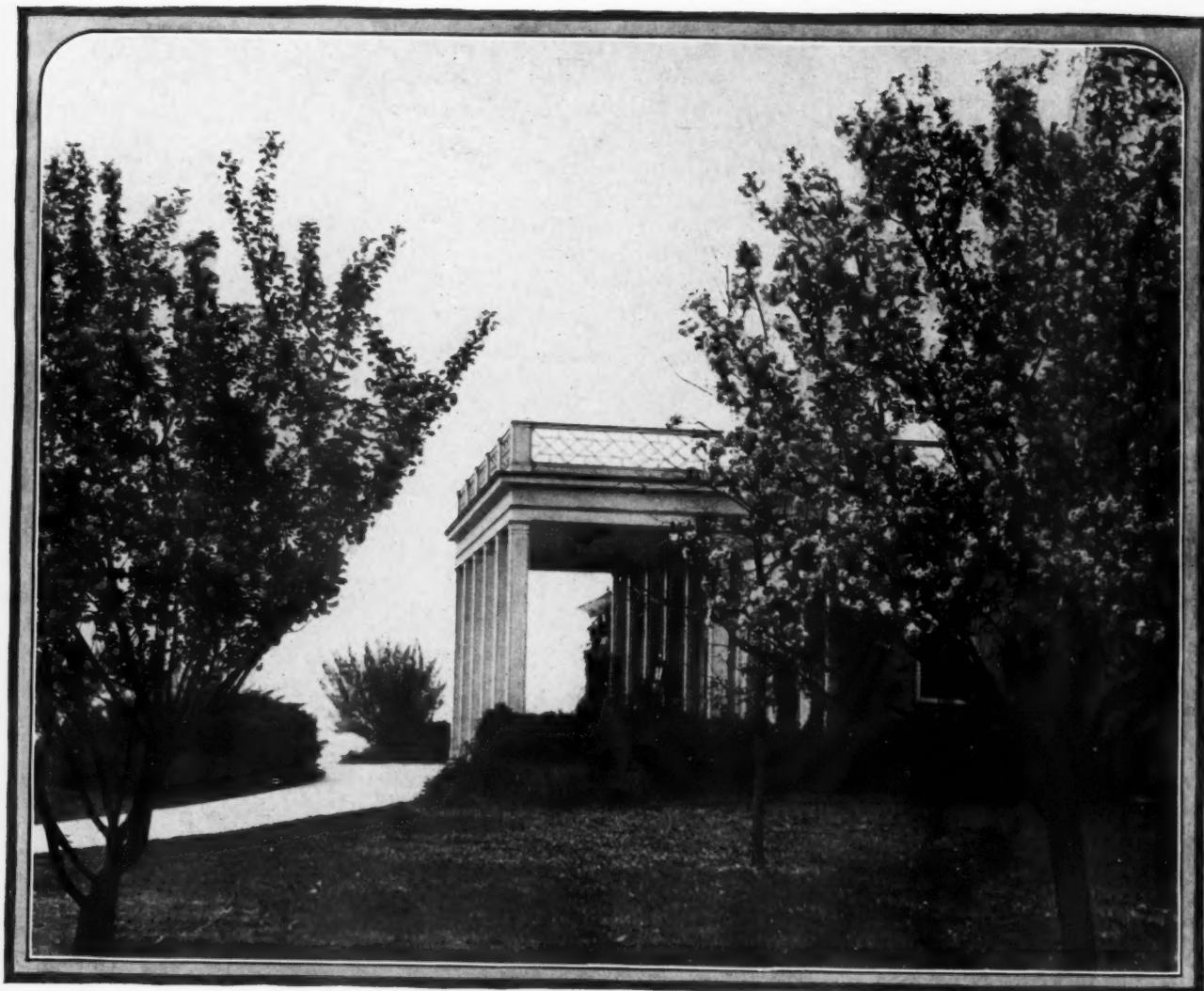
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© Harold Gray

The Japanese Cherry Blossoms in Potomac Park, Washington, D. C.



Improvement in Milling Practice in Michigan Copper District

Improvement in milling practice in the Michigan copper district is reflected by the recovery of 8,290,076 lbs. of copper by table treatment of waste conglomerate sands by the Lake Linden and Tamarack reclamation plants of Calumet & Hecla Consolidated last year. The coarse sands were subjected to table treatment and the fines to leaching and flotation, 18,212,000 lbs. being recovered through leaching and 4,486,000 through flotation. Results at the plants vary as new areas of sand are dredged.

When deposits dumped into Torch Lake during the earlier years of Calumet & Hecla are encountered, the yield is higher on account of the cruder methods of extraction employed in the earlier days. Losses were comparatively high at that time. Sands deposited in later years contain considerably less copper, the losses decreasing as methods improved. At the Lake Linden plant last year, sand above the average grade was treated, and as a result a new high record of copper production was obtained, in spite of a lower yield at the Tamarack plant on account of running into a considerable amount of amygdaloid sand. For the two plants 11.24 lbs. of copper per ton of sand treated were recovered. This compares with an average yield of 10.49 lbs. since treatment of the sands was started at the Lake Linden plant some years ago.

Pinto Valley Leaching Operations

The Pinto Valley Co., holding mineralized ground in the Inspiration-Miami district, Arizona, is experimenting with a modified form of heap leaching, which is said to show very favorable results. This process includes the piling of crushed ore on concrete platforms surfaced with asphalt. A weak solution of ferric sulphate and sulphuric acid will be applied to the ore piles, the object being to carry into the mixture free oxygen to assist the chemical reaction. Precipitation of the copper in the solution drained from the heap will be by electrolysis or upon iron. It is proposed to warm the solutions before they are applied to the heaps, which themselves will be kept warm by being enclosed under glass. This plan contemplates a reduction of the leaching cycle to 20 days.

New Plant at Boundary Cone

The Boundary Cone Mining Co., Mokelumne Hill, Calif., is installing a gravel-washing plant of 200 cubic yards daily capacity. The plant is to be electrically operated and a 17,000-volt branch transmission line, connecting with the high-tension line of the Pacific Gas and Electric Co., is being erected. Contract has been let for the installation of the necessary transformer station.

WESTERN DIVISION MEETING, AMERICAN MINING CONGRESS

The 1927 Annual Meeting of the Western Division of the American Mining Congress is to be held in Salt Lake City, Utah, the week of August 22. Local arrangements for the meeting will be made by the Utah Chapter of the American Mining Congress, and the Utah Section of the American Institute of Mining and Metallurgical Engineers. The A. I. M. E. has been formally invited to occupy one day of the meeting with its regional conference. Other mining organizations that may appropriately meet in connection with the occasion will be invited to do so if they desire.

As soon as possible the officers of the division will submit an outline of the program for the consideration of the Board of Governors of the Division. Several subjects that have already been suggested will be considered, and other suggestions are invited. Efforts will be made to restrict the formal portion of the program so that there will be ample opportunity for those attending to visit local mines and plants, and take advantage of other recreational features.

Calumet & Hecla Exploration

As a result of an intensive geological survey extending over the last seven years, the Calumet & Hecla Consolidated Copper Co. has planned extensive exploratory work in Keweenaw Co., Mich. The first work will be undertaken at the old Cliff and Phoenix fissure workings. These will be a fair test of the exploratory program as a whole. This will be the first consistent exploration program, based entirely on geological and practical mining considerations, ever carried out in the district.

With four-year options on over 9,000 acres of intervening land, the company will have control of a continuous area of nearly 100,000 acres.

Moving Pictures to Show Progress at Mine

The Buckingham Mina Consolidated Mines Co., operating near Battle Mountain, Nev., will use moving pictures to show stockholders the progress made during the last year.

A small moving-picture camera designed for the use of amateurs was used by Albion Youngholm, secretary of the company, to record progress at the mine. These films, suitably captioned, will be exhibited at the annual stockholders' meeting.

During the past year the company expended \$181,000 in building a new 50-ton mill, tramway, mine buildings, and in development. The company reports development of 60,000 tons of milling ore averaging better than \$15 per ton.

Hanna to Operate Loretto

Effective April 16, The M. A. Hanna Co. took over the operation of the Loretto iron mine at Loretto, Mich., on the eastern end of the Menominee iron range. Shipments will go forward regularly from this mine.

Changes in surface and underground operation will be made in the next two months. The mine has been hoisting ore on cars in cages. Skips will now be installed. A shaft, which has been used as a timber shaft, will be equipped for handling men, and the miners will no longer use the hoisting shaft for traveling up and down. Electric haulage will be installed as rapidly as possible.

Considerable exploration and development work will be undertaken with effort centered on the bottom of the twelfth level. The shaft will be extended to this level and development undertaken as soon as equipment changes are made.

P. A. Carmichael, formerly superintendent of the Hobart mine at Gilbert, Minn., for the Hanna Co. and more recently mine inspector for the organization, will be superintendent at Loretto.

The Bristol Mining Co., with iron mine at Crystal Falls, Mich., on the Menominee iron range, will remodel its headframe to accommodate an additional crusher and other equipment. The output from the Bristol shaft will be increased by mining and hoisting through the Bristol manganiferous ore from the adjoining Youngstown property of the U. S. Steel Corporation.

Hanna Takes Over Iron Mountain Mine

The M. A. Hanna Co. has taken over the operation of the old Iron Mountain mine at Iron Mountain, Mo., about 70 miles south of St. Louis. The Hanna Co. will continue the operation of the mine and conduct a campaign of diamond drilling. The concentrating plant at the mine will continue production on conglomerate ore only, for the time being. A. E. Walker, of the M. A. Hanna Co., will be in charge of geological work on the property.

The Iron Mountain property has until recently been controlled by Leonard Busby and associates of Chicago. The mine is a producer of specular hematite of a very high grade and has been in almost continuous operation since its opening in 1847.

Record Blast Made at Iron Mine

A blast of 880 cases of powder moved 150,000 tons of iron ore at the Palmer Milling Co.'s Volunteer mine, near Marquette, Mich., where half of a large hillside was blown away recently.

This feat was the greatest ever attempted in the Lake Superior mining district. Preparations for the blast were in progress for weeks. The high side of the hill blown away was 700 feet long and 300 feet wide. Seventy-two holes were drilled from 80 to 90 feet deep.

The dynamite fired totaled 43,700 pounds, and from 450 to 900 pounds of powder and 60 percent dynamite were used in each hole.

F. W. Bradley Buys Quicksilver Property

Fred W. Bradley, president of the Bunker Hill & Sullivan, and associates have acquired the Sulphur Bank quicksilver deposit on the eastern shore of Clear Lake, 10 miles north of Lower Lake in Lake County, Calif. The deposit will be mined with a power shovel and treated in a 100-ton rotary furnace. The property was mined for sulphur in 1865, and was the scene of a quicksilver discovery in 1873. Mercury Mining Co., controlled by the Bradley interests, has developed a quicksilver deposit 20 miles west of McDermott, Nev., and 1½ miles north of the Nevada-Oregon line. The production is 350 flasks a month.

At the invitation of Dr. W. O. Hotchkiss, president of the Michigan College of Mining and Technology at Houghton, the Michigan Engineering Society is planning a pilgrimage to the Michigan copper district this summer. Byron E. Parks, of Grand Rapids, has been named chairman of a committee to arrange the tour.

EXPLOSIVES MANUFACTURERS COMMEND DR. MUNROE

In recognition of his long and active career in the study of the technology of explosives, the Institute of Makers of Explosives requested Dr. Charles E. Munroe, chief explosive chemist, Bureau of Mines, to prepare the introduction to the "History of the Explosives Industry in America," which is to be published by the institute. In appreciation of his preparation of this introduction the institute has adopted the following resolution:

"WHEREAS Dr. Charles E. Munroe, the eminent explosive expert, whose reputation in and knowledge of the manufacture and use of explosives is unsurpassed, has taken his valuable time to write an introduction to the History of the Explosives Industry in America: Now therefore be it

"Resolved, That the Institute of Makers of Explosives extends its unmeasured thanks to Dr. Munroe for the service he has rendered in writing such introduction, and its profound appreciation of the honor of having such a world-renowned expert undertake this task on its behalf."

Renewed Activity at Bodie

The Bodie Gold Mining Co., a subsidiary of the American Mining Corporation, has acquired control of the Standard, Hoggins and Hearst and other properties at Bodie, Calif. Preparations are being rapidly completed for extensive work on these properties. The old Standard Mill, provided with modern mill equipment, will be operated on a large tonnage of low-grade ore exposed in the mines as soon as the snow melts sufficiently to permit steady operations.

Kay Copper to Build Mill

Kay Copper Corporation, James J. Godfrey, president, with mines at Canon, Ariz., and head offices at 25 Broadway, New York City, is proposing to submit to an early meeting of its stockholders a bond issue of 7 percent, 15-year gold bonds, the funds to be used for the early construction of a 1,000-ton mill on the property to handle the \$35,000,000 gross values of ores, as reported to them by their engineers. The milling plant proposed is expected to cost about a million dollars. It is also proposed to sink a new 2,000-foot shaft.

Tri-State Mill Burned

The 300-ton mill of the Tar Creek Mining Co., 3 miles northwest of Picher, Okla., was destroyed by fire the latter part of March, with a loss of approximately \$75,000. The mill, which was mostly covered by insurance, will be rebuilt immediately.

Oro-Golconda Takes Arizona Properties

The Oro-Golconda Mining Co. has taken over the mining estates of the Oro Plata, Middle Golconda and Golconda Mining Companies. During the early days of the World War, the Golconda was shipping an average of 1,500 tons of high-grade zinc monthly. The mines are situated about 16 miles north of Kingman, Ariz., and approximately 4 miles from the Chloride branch of the Santa Fe Railroad. The power line of the Desert Power and Water Co. crosses the property close to what will be the mouth of the new transportation tunnel.

Giant Hoist to Aid Warren Shaft Sinking

Sinking Operations at the new Warren Shaft of the Phelps Dodge Corporation, Copper Queen Branch, Bisbee, Ariz., G. H. Dowell, manager, will be aided by the installation of a giant hoist to be brought from the Moctezuma Copper Co. branch at Nacozari, Mexico. This hoist has been in use at a shaft at Nacozari, which has been temporarily abandoned. The three-compartment shaft is now down below the 450 level, with the contractors averaging 7.57 feet per day.

Sinking Shaft at Red Lake

Three hundred tons of mining equipment and supplies have arrived at the Howey Red Lake mines and shaft sinking to 500 feet has been commenced, according to reports from Red Lake, Ontario. Four levels are to be opened up, and it is expected this work will be well advanced by the fall. It is believed a milling plant will be taken in next winter. This is the property which caused the Red Lake rush and was under option to Dome mines during the early days of the camp. Extensive diamond drilling by this company indicated important ore bodies which are to be developed by the original company, Howey Red Lake mines.

Utah Apex to Save Iron

The production of an iron concentrate in the mill of the Utah Apex Mining Co., Bingham, Utah, was forecast recently by R. F. Haffenreffer, president of the company.

An article on the design and operation of the Utah Apex Mill by Ernest Gayford, was published in the February issue of THE MINING CONGRESS JOURNAL. Present mill products are lead concentrates, zinc concentrates and copper concentrates. The production of iron as a fourth concentrate will require expansion of the plant. This is now under consideration. The iron concentrate will be sold to some smelter.

To Reopen Congress Mine

The Congress mine, the deepest gold mine in Arizona, stoped to a depth of 4,200 feet, has been taken over by a syndicate, and it is planned to treat the dumps and reopen the mine. The shaft will be unwatered gradually, the water to go into a mill which will be erected to treat the tailings.

New Lead Roaster at the El Paso Smelting Plant

The El Paso smelting works of the American Smelting and Refining Co. is just completing the construction of a 150-ton lead roaster, to be especially adapted to the handling of lead-sulphide ores. While smelting at the El Paso plant in 1926 was slightly below that of 1925, the company is preparing for heavy runs in lead in the future.

Although the El Paso smelter was originally built nearly 40 years ago, to smelt silver-lead ores, in recent years it has gone into the smelting of copper ore and concentrates on a large scale. The copper department was opened up in 1910, the principal ores and concentrates coming from the old Chino mines in Grant County, N. Mex.

Prior to 1912 copper matte, coming from the blast furnace, had to be shipped to the smelting plant at Aguas Calientes, Mexico, for further refining. Since then converters have been installed, two reverberatories put in, and several roasting furnaces installed for drying the ores. The value of the ore smelted in El Paso ranges from \$20,000,000 to \$25,000,000, and the pay roll runs around \$1,000,000 per annum. It is the largest custom smelter in the United States.

Plans are being prepared for a plant to handle complex lead-zinc ores by selective flotation.

New Invention May Prove Another Use for Copper

Copper fabricators are understood to be greatly interested in the development of a copper steam radiator for heating buildings. This new type of radiator is much more compact and is lighter than the cast-iron radiator now in use, and, if accepted, promises to open an outlet for the distribution of copper. It occupies only one-third of the space of the iron radiator and weighs only one-eighth as much.

In the new device a coil of seamless copper tubing distributes the steam, or hot water, to a patented arrangement of fins which creates a radiating surface equal to that of the cast-iron radiator. The new building of the New York Edison company has been equipped with these radiators and several additional important installations are in prospect.



BauKite Outcrop Near Louisville, Winston County, Miss. A test hole was drilled 13 feet down in the bottom of the pit and the deposit continues indefinitely lower. Dr. H. J. Bryson, State Geologist of North Carolina making an examination

Seek Reduction in Manganese Duty

A consumer of manganese ore has filed an application with the United States Tariff Commission for a reduction in the present duty of 1 cent per pound on 30 percent high grade manganese ore. A preliminary study will be made by the commission and if the application seems justified the commission may order an investigation, which will cover the costs of production in the United States and abroad. The requested cut is one-half of the present duty and is the maximum permitted by the tariff law.

Company Organized to Explore Meteor Crater Property

The Meteor Crater Exploration and Mining Company has been organized by G. M. Colvocoresses, of Humboldt, Ariz., and D. M. Barringer, of Philadelphia, for the purpose of exploring the Meteor Crater property, between Flagstaff and Winslow, Ariz. The new company proposes to lease for 99 years from the Standard Iron Co., owned by D. M. Barringer and associates. This company drilled some 20 holes in the center of the crater on the theory that the meteorite had fallen vertically, but failed to locate any large mass of meteorite material.

In 1922 the United States Smelting, Refining and Mining Exploration Co. put down a test hole on the south rim of the crater to a depth of 1,376 feet, where they lost their tools and were forced to quit work. In the lower levels a series of hard boulders composed of

iron oxide and nickel was encountered. The new company is building its hopes largely on the findings in the test hole. After financial arrangements have been made for the work the company plans to sink a shaft, aiming for a point below the bottom of the old drill hole and explore the mass by drifting.

Eagle Picher Lead Purchases Mine

The Montana mine, in the Oro Blanco district, 70 miles south of Tucson, Ariz., has been purchased by the Eagle Picher Lead Co. The property changed hands April 1. The Montana mine has been under option for the last six months by the Eagle Picher and the purchase follows diamond drilling and preliminary development which has been under way during that time. The present plan is to sink the 250-foot shaft to the 400 or 500 level for prospecting purposes.

Gold Cliff Co. Acquires Feldspar Deposits

The feldspar deposits of the Kingman Feldspar Co. have been acquired by the Gold Cliff Central Mining Co., M. J. Kiely, president, and George McDevitt, secretary-treasurer and general manager, Kingman, Ariz. Since the property was acquired a 50-ton car is loaded out every three days, shipments going to a grinding plant in Los Angeles. As soon as bunkers are completed, a carload is to be shipped every day. The mine is located 6 miles north of Kingman and about 4 miles from the Santa Fe Railroad at Louise Station.

NEW MOTION PICTURE FILM WILL VISUALIZE STORY OF PETROLEUM

The addition of an elaborate motion-picture film visualizing "The Story of Petroleum" to the already large library of educational films owned by the United States Bureau of Mines, is assured by the appropriation by the American Petroleum Institute of the sum of \$25,000 to be expended in cooperation with the bureau for the production of a motion picture depicting the various phases of the petroleum industry.

It is planned to illustrate in detail the production, transportation, refining and marketing of petroleum. Representative oil fields in all parts of the United States will be visited in the making of the film, and the different field operations peculiar to these fields will be portrayed in detail. Safety methods and appliances will be given special attention as the Bureau of Mines is at present engaged in conducting a safety-first campaign in the oil industry.

That part of the motion picture devoted to the transportation of oil

will tell the complete story of the construction and operation of the nation's enormous network of pipe lines. The laying of pipe lines across deserts and mountain ranges and underneath river beds will be depicted. The wholesale movement of crude oil in oil tankers and the special equipment for loading and unloading the oil at terminals will be shown. The place of the railway tank car in the transportation of petroleum and its products will also be visualized.

A graphic visualization of oil refinery technique is planned. The tremendous system by which the refined products of petroleum, including gasoline, kerosene, etc., are marketed and distributed will be shown in detail.

It is planned to begin work upon the picture within the very near future. The making of the film will probably require several months' time.

Nevada Consolidated Acquires Ray Hercules

The Nevada Consolidated Copper Co. has acquired all of the mining property and equipment of the Ray Hercules Mines, Inc., adjoining its Ray mines at Ray, Ariz. Deeds conveying the property have been filed at the county recorder's office by Ellis P. Earle and J. Guthrie Hopkins, of New York City. The Ray Hercules properties were sold under foreclosure proceedings some three years ago and were then purchased by Messrs. Hopkins and Earle.

New Mill at Big Chief Is All Flotation

The new mill at the Big Chief mine of the American Zinc Lead and Smelting Co. has been placed in operation. The plant is all flotation with its flow sheet similar to that of the tailings mill recently completed at the Blue Goose mine of the Commerce Mining and Royalty Co.

All grinding will be done in a rod mill, which is the largest that has been installed in the district. Equipment in the plant includes two 4-cell rougher jigs, a Butchart drag classifier, ore table and five flotation machines.

Arizona Copper Belt Starts Active Development Campaign

Having completed work on patenting the entire group of claims, the Arizona Copper Belt Mining Co. has started an active development program under the direction of John Harlan. This company is developing 350 acres of copper, gold and silver mineral land at Constellation, Ariz., 12 miles northeast of Wickenburg, in the Black Rock mining district, adjoining endwise on the north and west

the Monte Cristo silver mines, now being operated extensively by the Julian Merger Mines, Inc., of California.

Oregon Tin Property Optioned

It is reported that the American Smelting and Refining Co. has taken a 90-day option on a group of mining properties 10 miles northeast of Grants Pass, Oreg., at a reported purchase price of \$100,000. Sampling results are said to show tin ore of workable grade. The option was given by Earl and George Young who have been doing preliminary prospecting work at the properties.

Colorado Inc. Mines to Start New Mill

The Colorado Incorporated Mines at Ouray expects to put its new 100-ton mill in operation shortly and ship a carload of concentrates daily. Approximately \$250,000 has been spent on the mill and other needed improvements. A mile of tramway connects the property with the mill. During the past year the force at the mine, mill and tramway has varied from 60 to 75 men, and with the mill in operation it is planned to employ a larger force.

Fairbanks Exploration Co. Orders Seven Dredges

The Fairbanks Exploration Co., Fairbanks, Alaska, a subsidiary of the United States Smelting, Refining and Mining Co., has placed a contract with the Bethlehem Shipbuilding Corporation, Ltd., for the construction of seven gold dredges. Two of these are to be finished in 1927, two in 1928, and three in 1929. The dredges will be designed and constructed under the supervision of officials of the United States Smelting Co.

U. S. Smelting Drilling Utah Property

The United States Smelting, Refining & Mining Co. has started diamond drilling in the property of the Central Standard Mining Co., at Eureka, Utah. Two shifts are working, and they are averaging 50 feet daily. The Central Standard is north of the North Lily, adjoining the Tintic Standard.

California Property Sold to Arrowhead Development Co.

The Supply gold mines, in the Dale mining district, San Bernardino County, Calif., have been purchased by the Arrowhead Development Co. of Tonopah from Philip Wiseman and the heirs of the Seeley W. Mudd estate. In addition to a cash payment, a royalty will be paid the latter. The property consists of seven patented claims, a 100-ton stamp mill, a cyanide plant, a hoist, a compressor, and pumping and electrical equipment. The Arrowhead Co. operates the United Eastern mine at Oatman, Ariz.

Bagdad Cons. Mining Co. Takes Over Holdings of Pacific Mines Corp.

The Bagdad Consolidated Mining Co., of Los Angeles, has been organized to take over the holdings of the Pacific Mines Corporation, consisting of 420 acres of patented mineral ground in San Bernardino County, Calif., including mine and mill equipment, and 8 miles of standard and fully equipped branch railroad, connecting the property with the Santa Fe Railroad at Ludlow. The officers of the company are: J. H. Hobbs, president; Judge J. M. Stevens, vice president and treasurer; R. G. Graves, secretary; and Frank Oliver, manager. Mine operation and development are now under way, and as soon as repairs have been made the 125-ton modern milling plant at the mine will be placed in regular commission. It is said that 500,000 tons of milling ore are available above the 300-foot level.

North Star Extends Shaft 1,900 Feet

A 1,900-foot extension of the vertical shaft, together with stations and ore bins, has been completed and put in operation by the North Star Gold Mines Co., Grass Valley, Calif. This makes the total depth of the North Star shaft 3,538 feet, the bottom being 1,050 feet below sea level. At this level the ore is cut at 8,600 feet from the surface on the incline of the vein, making the North Star in depth, measured on the vein, one of the deepest mines in the world.

The Tom Reed Gold Mines Co. is actively at work in the development of its Allison mine at Tucson. Included in the development of the property is the construction of a 40-ton mill, which it is planned to commence operating within the next 30 days.

NINTH ANNUAL MEETING OF AMERICAN ZINC INSTITUTE

At the ninth annual meeting of the American Zinc Institute, held at the Statler Hotel, St. Louis, Mo., April 18 and 19, it was evident throughout that the miners of zinc in the Tri-State district and the retort smeltermen of the Middle West have two problems to face, and although not distinctly in the same ratio, these problems have an important bearing on the future of the industry.

Even the report of the adjustment, or "fence busting," committee was overshadowed by these other problems, which are, first, economic; second, consumption. The extent to which these two problems eclipse the "fence problem" was indicated in the paper of E. M. Johnson, of the Eagle-Picher Lead Company, on "The Smelting of Zinc," in which he said: "While you are discussing the fence problem, others are getting away with the cattle."

Percy B. Butler, chairman of the adjustment committee, announced that the smelters had complied practically in full with the mine operators' demands, presented at the eighth annual meeting, calling for a full interchange of statistics.

A bimonthly report on slab zinc stock at smelting plants in the United States will be made, beginning with the present month. Although miners had asked for a weekly report, Mr. Butler stated that the smelters had conclusively proved that it would be impossible to make the report more than twice a month. Smelters would soon endeavor to make a report on the amount of ore at smelting plants and in transit.

Smelters are now having prepared, through a neutral agency, their average costs for producing a ton of metal, Mr. Butler stated. In addition they will endeavor to make a more complete accounting as to the prices received for metal.

Mr. Johnson read, as a part of his paper, a report of the Geological Survey of Missouri for 1875 and 1876, which dealt with the "Metallurgy of Zinc." Then he compared that 50-year-old report with present practices.

"In 50 years the amount of ore charged per retort has more than doubled," said Mr. Johnson, "while the cubic capacity has not quite doubled. The recovery of zinc has increased 1 percent in spite of the increased charge and increased percentage of finer concentrates. Why has it taken 50 years to accomplish this?"

He brought to the fore the worries of the smelters, when he said: "The question naturally arises which is the best way to treat these various (zinc concentrate) products. Can all or any of them be best treated by the electrolytic; by

the retort process direct; by preliminary roasting for acid following sintering; by electrothermic; or by briquetting?"

James A. Stader, representative of the Bureau of Mines, Washington, D. C., read a paper on "Research." He stated that "to the constant research of the electrical industry we are indebted for cheaper power every year, shortening that inevitable time when electro-metallurgy will largely, if not wholly, supersede pyrometallurgy."

P. B. Butler was toastmaster at the annual banquet held the night of the 18th, and at which Dr. John L. Davis, of New York, was the principal speaker. The arrangement committee provided a cabaret performance instead of the usual vaudeville as the entertainment feature of the banquet.

Jesse G. Starr, of Joplin, president of the Quinton Spelter Company, was elected president to succeed A. P. Cobb, of New York, vice president of the New Jersey Zinc Company, at a meeting of the board of directors. Mr. Cobb was elected first vice president; Julius W. Hegeler, of Danville, Ill., second vice president; John W. McCarthy, of New York, third vice president; Howard I. Young, of Mascot, Tenn., was reelected treasurer; and Stephen S. Tuthill, of Brooklyn, was reelected secretary.

Eight directors, to serve for three years, were elected, as follows: P. B. Butler, Joplin; Mr. Young; Mr. Hegeler; Charles H. A. de Saulles, New York; William A. Ogg, Boston; Mr. McCarthy; Henry A. Wardner, New York; and Mr. Starr.

Ralph M. Roosevelt, New York, and E. W. Furst, Cleveland, were elected to fill the vacancies on the board left vacant by the resignations of William N. Smith, Plattsville, Wis., and E. R. Grasselli, Cleveland.

The delegates were welcomed to St. Louis by Harold M. Bixby, president of the Chamber of Commerce, after which Secretary Tuthill read a paper on the "World Zinc Survey," prepared by A. J. M. Sharpe, of London.

Mr. Ogg, chairman of the committee on statistics and economics, presided while the papers prepared by Otto Ruhl, E. M., of Joplin, on "Tri-State District Survey," and "Mining Economics," prepared by Julian D. Conover, Miami, Okla., secretary of the Tri-State Zinc and Lead Ore Producers' Association, were presented.

Mr. Conover discussed in detail the cost figures compiled by the association, showing the cost of producing a ton of zinc concentrates in the Tri-State district.

Mr. Ruhl discussed the trend of mining and milling practices in the Tri-State

field and the progress being made in the developments of additional ore reserves.

Howard I. Young, chairman of the finance committee, presided at the opening meeting Tuesday morning, at which a paper entitled "The Transmutation in the Tri-State District," prepared by Richard Jenkins, Baxter Springs, Kans., secretary of the Tri-State section of the American Zinc Institute, was read. Mr. Jenkins outlined the financial problems of the section.

The second problem confronting the Institute, that of consumption, came up for full discussion when the reports of the galvanizing and publicity committees were offered. F. C. Wallower, Joplin, chairman of the galvanizing committee, and C. F. Beatty, chairman of the publicity committee, presided during the discussions on these two topics.

"The Outlook for Zinc Coated Products," a paper read by C. L. Patterson, Pittsburgh, Pa., secretary of the sheet steel extension committee, outlined the work being done by that body to create a larger market for a better coated zinc sheet.

Mr. Wallower suggested that the Institute appropriate a sum of money to pay for the services of a salesman to sell the idea of a better coated sheet to the jobbers.

Mr. Beatty outlined a financial plan for the raising of a considerable sum of money, to be spent in trade journals for the advertising of zinc products.

Members of the galvanizing and publicity committee were anxious that the problem of consumption be given immediate attention. In regard to the problem of consumption, Mr. Stader, in his paper of the previous day, gave the members something to think about along lines of consumption when he said: "At present we have a production capable of expansion. Mining, and especially metallurgical methods, are far from perfect. Although there is all this opportunity for expansion, Lloyds, who are reputed to be willing to insure anything or any risk, would probably not be willing to insure the present rate of consumption of zinc beyond a couple of years." Mr. Stader also emphasized the progress that is being made in the making of a rust-proof iron, and stated that "this will certainly be a sad epoch to the whole zinc industry unless through previous research other uses are found to take up the slack."

The closing session of the two-day gathering was devoted to a round-table discussion on mining and metallurgical improvements, at which Dr. Dorsey A. Lyons, chief metallurgist, United States Bureau of Mines, presided.

Anaconda to Erect New Zinc Plant

J. R. Hobbins, vice president of the Anaconda Copper Mining Co., has announced the decision of the company to commence immediately the erection of an electrolytic zinc plant at Anaconda.

The Great Falls electrolytic zinc plant of the company is now producing at the rate of 20,000,000 pounds of zinc a month. The capacity of the Anaconda plant will be 10,000,000 pounds a month, or a total of 1,000,000 pounds a day, which is 13 percent of the world's and about 30 percent of the United States' production of zinc in 1926.

The plant will treat ores and concentrates from Idaho and Utah in addition to the ores from Butte and other Montana districts.

The operation of the new plant will require about 30,000 h. p., which will be furnished by the Montana Power Co.

American Metal Co. Enlarges Scope of Lead Smelting Operations

According to the terms of the lease under which the American Metal Company will take over the plants of the Balbach Smelting & Refining Company on May 1 the latter will become a subsidiary of the Metal Company. The American Metal Company has the option of buying outright the plants at Port Newark, N. J., at the end of the five-year period for which the lease will run.

The Balbach plants will be under the management of the United States Metals Refining Company, of Chrome, N. J., a subsidiary of the American Metal Company. The leasing of the Balbach plants is an important step in enlarging and rounding out the business of the American Metal Company, as it owns large lead ore mines in Mexico and other parts of the world, but has had no lead smelting and refining plant.

Ducktown Chemical & Iron Control and Properties, Acquired by Copper Pyrites Corp.

Control of Ducktown Chemical & Iron Co. has been acquired by Copper Pyrites Corp. This control, together with its rights on the school property, has been transferred by Copper Pyrites Corp. to a new corporation, organized under the laws of Delaware, known as Ducktown Pyrites Corp.

William Y. Westervelt, president of Copper Pyrites Corp., has been elected president of both Ducktown Chemical & Iron Co. and Ducktown Pyrites Corp. F. M. Kirby, A. P. Kirby, and William Y. Westervelt, of the latter board, have been elected directors of Ducktown Chemical & Iron Co.

Operations will be continued under name of Ducktown Chemical & Iron Co., offices of which company are at Isabella, Tenn. Local organization will also con-

tinue under the vice president and general manager, W. F. Lamoreaux.

Consolidation of Large Zinc Mining Interests Being Negotiated

Negotiations are reported underway for the consolidation of the Barnsdall Zinc Co., the Butte-Kansas Co., and the Acme Mining Co., all operating in Missouri, Kansas and Oklahoma, which will result in the third largest zinc producing company in the United States, to be known as the Missouri-Kansas Zinc Co.

The combined properties hold leases to surface and mineral rights over more than 660 acres of potential zinc producing lands, with four operating mills and one reserve mill, with an aggregate capacity of more than 3,000 tons of concentrates monthly.

"Slasher" Harrington Killed

John P. Harrington, of Miami, Ariz., known through the Southwest as "Slasher" Harrington, was killed in an automobile accident near Bisbee, Ariz., on April 2. Mr. Harrington had an established reputation in the contracting of shaft sinking. In recent years he had put down shafts under contract at the Inspiration, Old Dominion, Kay, Western Apex, and other mines. At the time of his death, he was sinking a shaft at the Bisbee Queen for the United Verde Extension Mining Co. In earlier days in Arizona "Slasher" Harrington was many times the winner in hand-drilling contests.

Washington Mineral Survey

Plans for a comprehensive survey of the mining resources of Washington State—an industry that now means \$21,000,000 annually to the district—will be devised by the newly created mines and minerals department of the Seattle Chamber of Commerce, it was announced by Reginald H. Parsons, chairman. This new department, comprising 53 prominent mining, business and professional men, was created to cooperate with the Seattle Mining Club in aiding the industry in the Northwest and Alaska.

Anthracite Conciliation Board Hears Check-Off Arguments

The Anthracite Conciliation Board was asked to give its interpretation of paragraph 4 of the anthracite wage agreement at a meeting of the board at Philadelphia, April 22. This paragraph provides that the "Conciliation Board shall work out a reciprocal program of cooperation and efficiency," and was sidetracked during the negotiations for the settlement of the strike of 1925-26.

Since the men returned to work it has been the contention of the United Mine Workers that this paragraph meant the

adoption of a modified check-off under which the union dues would be collected by the operators and turned over to the treasurers of the local unions. Several minor clashes have occurred over this claim, but the operators have never officially stated their interpretation of the paragraph.

The operators were represented by J. B. Warriner, president of the Lehigh Coal & Navigation Company; W. J. Ingalls, of Scranton; and W. J. Richards. The mine workers officials present were John L. Lewis, president of the union; Cris J. Golden, Rinaldo Cappellini, and Andrew J. Matthey, all district presidents. Richard F. Grant, of Cleveland, credited as the principal factor in the ending of the strike, was also present.

Steel Corporation to Establish Research Laboratory

The United States Steel Corporation is planning to establish a technological laboratory. George Gordon Crawford, of Birmingham, Ala., president of the Steel Corporation's Alabama subsidiary, the Tennessee Coal, Iron & Railroad Co., has been named chairman of a special committee to plan this new department.

Plans for the laboratory have not been perfected, but the Steel Corporation expected to work out an ambitious research program. All details are in the hands of the special committee.

Revise Ohio Mining Code

The Roberts bill, known as House bill No. 207, making a number of changes in the Ohio mining code, has passed both houses of the Ohio General Assembly and awaits action by Governor Donahey. The bill changes a number of features in the Ohio code in the interest of safety. One of the principal provisions is the use of rock dust to prevent mine dust explosions. Other provisions have to do with electrical current supplying underground motors, with restricting the number of men to be conveyed on cages, and with the opening and closing of wells in mines. It is believed that the governor will approve the measure.

Instructing 1,400 Coal Miners in First Aid

The story of the methods by which it was possible to give the United States Bureau of Mines first-aid training to 100 percent of the employes of two large Illinois coal mines is told by Alex. U. Miller, assistant mining engineer, in Information Circular 6020, recently issued. As a result of this concentrated effort approximately 1,400 employes of mines Nos. 9 and 12 of the Madison Coal Corporation, Dewmaine, Ill., took this training. Copies of Circular 6020 may be obtained from the Bureau of Mines, Department of Commerce, Washington.

Monongahela Fuel Company Organized in W. Va.

The Monongahela Fuel Company, with a capitalization of \$2,500,000, has been organized to merge the coal properties of the Fairmont & Cleveland Coal Company, owning the Parker Run mine at Rivesville, W. Va., and the Fairmont-Chicago Coal Company, operating the Chesapeake mine at Barrackville. W. E. Watson is president and general manager of the new company, with offices at Fairmont.

The Monongahela Fuel Company through the merger acquires two large mining plants, two mining towns, and approximately 4,000 acres of coal land in Marion County, with an annual production of about 1,000,000 tons.

Hillside C. & I. Co. Completes New Breaker

The erection of the new \$700,000 modern concrete, steel, and glass coal breaker of the Hillside Coal & Iron Company at Dupont, Pa., has been completed.

The erection of this breaker is regarded as a rare accomplishment by mine officials in the anthracite region, not a single day's work having been lost since the dismantling process started back in 1923, under the supervision of General Superintendent Joseph P. Jennings. The breaker is one of the most modern in the anthracite region and is devoid of all dust except at the tip. This difficulty will be taken care of by the installation of an electric fan.

The construction work in its entirety was accomplished by the employees of the colliery. The new breaker has a daily capacity of 3,200 tons, as against 3,000 for the old operation, and will employ 1,100 workmen.

The Hamilton mine of the Tennessee Coal, Iron & Railroad Co., near Birmingham, Ala., is to be improved and the output substantially increased. Work was begun recently on the sinking of a large new shaft. A new washery is also under construction. Electrically driven hoists will be used and additional track will be laid. About 300 new houses will be built and approximately 1,000 additional miners will be employed.

Two parallel tunnels over 2,000 ft. long are to be driven through the mountains at the Faraday operation of the Pocahontas Fuel Company in order to reach coal deposits in Tazewell County, Virginia. The shaft and tippie of the Faraday operation are located in McDowell County, while the major portion of the coal deposit is in Tazewell County. It is estimated that it will take about a year to drive the tunnels, which will provide for haulage and ventilation.

ROCK DUSTING IN COAL MINES

Recommendations of the American Engineering Standards Committee for standard practice in rock dusting coal mines have recently been published by the United States Bureau of Mines as Information Circular 6030. Several members of the Bureau of Mines staff served on this committee, whose recommendations are essentially in harmony with those of tentative specifications previously published by the bureau in Serial 2606. As certain supplementary details contained in Serial 2606 are not included in the recommendations formulated by the American Engineering Standards Committee, that serial should be considered by coal-mine managements in conjunction with the committee's report now published as Information Circular 6030. Copies of both papers may be obtained from the Bureau of Mines, Department of Commerce, Washington, D. C.

List of Permissible Mining Equipment

A list of permissible mining equipment, approved by the United States Bureau of Mines, up to and including January 1, 1927, has recently been published. The list covers electric air compressors, coal drills, mining machines, loading machines, conveyors, mine pumps, room hoists, rock-dusting machines, switches, electric cap lamps, flame safety lamps, electric hand and trip lamps, flash lamp, methane indicators and detectors, blasting units, storage-battery locomotives, power trucks, self-contained oxygen breathing apparatus, and gas masks.

The system under which these devices were tested permits the manufacturer, after his equipment has passed certain tests prescribed by the Bureau of Mines, to mark his equipment with a seal showing that it has been "approved" by the bureau. These tests are designed to insure that the equipment has the minimum requirements for safety in use. The only object of the bureau in making such tests and publishing lists of permissible equipment is to safeguard the lives of workers and to help lessen the hazards of mining.

Some consideration is being given a plan to extend the tunnel of the East Utah Mining Co. through the Park City property of the Park Bingham Mining Co. into the property of the Park Galena Mining Co. This would permit deep exploration and the unwatering of the properties.

Missouri School of Mines and Mississippi Valley Experiment Station Offer Fellowships

The School of Mines and Metallurgy, University of Missouri, and the Mississippi Valley Experiment Station, United States Bureau of Mines, Rolla, Mo., offers four Research Fellowships in Mining and Metallurgy. Their announcement follows:

"In cooperation with the United States Bureau of Mines and the State Mining Experiment Station, the School of Mines and Metallurgy of the University of Missouri offers four fellowships. These fellowships are open to graduates who have the equivalent of a Bachelor of Science degree and have had the proper training in mining, metallurgy, or chemistry, and who are qualified to undertake research work. The income of each fellowship is \$800 per annum for the 12 months beginning July 1, 1927. Fellows pay fees amounting to approximately \$30 per year.

"Fellows will register as students in the School of Mines and Metallurgy of the University of Missouri, and become candidates for the degree of Master of Science (unless this or an equivalent degree has been earned). Their class work will be directed by the heads of the departments of instruction, but the greater portion of their time will be spent in research work under the direction of the Bureau of Mines staff resident at the School of Mines. The purpose of this work is to undertake the solution of definite problems confronting the mining and metallurgical industries of the state of Missouri. For 1927-28 the four fellowships will be granted in the following subjects: Metallurgy of Zinc, Beneficiation and Treatment of Metallic and Non-Metallic Ores.

Applications, with a certified copy of collegiate record, statement of professional experience, and names and addresses of three references will be received up to June 15, 1927. The application should be addressed to Director, School of Mines and Metallurgy, University of Missouri, Rolla, Mo.

Pittsburgh Coal Co. Improvements

Directors of the Pittsburgh Coal Company early in April authorized improvements and developments to mines in the Pittsburgh field to the extent of \$1,000,000, including three new tipples, one at Sommers, one at Ocean, and one at Banning No. 2 mines; and a new water supply system and mine equipment. Contracts for this work were immediately awarded, and the work is being rushed with the idea of increasing production at the earliest possible date.

West Virginia Mine School

With the possibility that the legislature will consider increasing the facilities of the school of mines at West Virginia University and provide means for carrying out the full provisions of the bill of two years ago, a statement has been made by Clement Ross Jones, dean of the College of Engineering of West Virginia University.

Dean Jones declares that if the school of mines, one of the most valuable divisions of the College of Engineering, is to continue to serve the needs of this recognized leading coal mining state, more adequate facilities must be provided.

This should include a new building to house the School of Mines and the closely allied department of chemical engineering, to cost approximately \$500,000. In addition the appropriation should include \$25,000 for the proposed two-year courses in mining engineering, \$10,000 for the first year and \$15,000 for the second, as well as \$70,000 to take care of the mining extension program and the short courses in mining, now being conducted, \$35,000 of this sum for each of the next two years.

Dean Jones gives a concrete report of the work that is being done in the School of Mines, prefacing it with an interesting resume of the importance of mining engineering to West Virginia and the progress that has been made in developing this branch of study at the state university.

Anthracite Valuations Under Fire

Heads of anthracite operating companies are awaiting with interest the state supreme court decision in the appeal of the commissioners of Columbia County from a decision of Judge Potter, of the county bench, on the coal lands assessment imposed by the county commissioners in 1922, which was approximately \$10,000,000. The Philadelphia & Reading Coal & Iron Company, which owns the lands in question, appealed from the valuation. The case was heard before Judge Potter, who finally reduced the assessment materially but at the same time allowed the county commissioners to increase it by some 36 percent over the 1919 assessment. The commissioners appealed from this decision, maintaining their valuation, which almost doubled the 1919 assessment, was justified. Anthracite producers are watching the outcome, as the supreme court decision will be applicable, it is expected, to all hard-coal county taxation. One of the questions is the valuation of "coal in the ground." A number of operators in other counties have appeals from valuations pending and these probably will be affected by the decision.

SUMMER COURSE IN COAL MINING AT CARNEGIE

A four weeks' course in coal mining will again be given by the Carnegie Institute of Technology during the coming summer in cooperation with the Pittsburgh Station of the U. S. Bureau of Mines, according to an announcement. The course is outlined to be of benefit to young coal miners who are ambitious to increase their efficiency and earning power.

The course will begin June 13 and will end July 9. Under special arrangements an examination for fire bosses, assistant mine foremen, and mine foremen will be held at Carnegie Tech by the Pennsylvania State Department of Mines immediately following the course on July 11, 12 and 13. The course is planned to prepare each student to pass these examinations.

At the morning sessions, which will be conducted at the Carnegie Institute of Technology, the work will cover instruction in mine laws and regulations, ventilation, gases, explosives, timbering, arithmetic, safety lamps, and methods of working. Afternoon periods at the Bureau of Mines will be devoted to study in mine rescue and first aid training, lectures and movies on mine safety, and coal dust explosion and permissible explosives demonstrations at the experimental mine.

Each student who satisfactorily completes the course will be awarded a certificate by Carnegie Tech and a Mine Rescue and First Aid Certificate by the United States Bureau of Mines.

Anthracite Strip Mining

A new policy by anthracite operators in the Schuylkill region is to be followed, according to operators at Pottsville. This will be to strip the surface off coal veins wherever possible instead of sinking slopes and shafts and to follow the policy of daylight mining, excepting in the immediate vicinity of Pottsville, where the deposits are deep, in many cases 3,000 feet or more below the surface. Objections on the ground that stripping operations will tend to disfigure the hills and mountains near Pottsville are met by the operators with the assertion that daylight mining is far preferable for the health and safety of the workers as such operations are free from danger of gas or dust explosions and that the method is far less expensive than that of sinking costly shafts requiring a heavy overhead expense to keep in safe condition.

The Debardeleben Coal Corporation will shortly put in operation a new drift opening at Corona, Walker County, Ala., to be known as Corona No. 16, which will add about 500 tons per day to the production at that point.

Sheridan-Wyoming Opening New Vein

The Sheridan-Wyoming Company will begin production soon in a new vein containing the largest amount of coal it has as yet uncovered. The vein measures 57 feet, 10 feet wider than the largest previous vein in Wyoming. Pitch of the vein is such that regular mine locomotives can haul trips out of the shafts. If the strike in union fields should continue for two or three months, Sheridan-Wyoming mines would be one of the principal producers in the western field whose supplies will be available to railroad and industrial consumers.

Utah Coal Companies Merge

The Superior Rock Springs Coal Company and the Premier Coal Company, Ogden, Utah, operating mines at Superior, Wyo., with property assets of more than \$1,000,000, have been merged into the Ideal Coal Company. While the two companies will be corporate entities, all of their operations and sales will hereafter be under the new firm composed of officers of both corporations.

Officers of the Ideal Coal Company are Lawrence T. Dee, president; Harold C. Day, vice president; R. B. Porter, secretary; F. N. Bletcher, treasurer; and Harvey F. Cahill. The company is capitalized at 250 shares without nominal or par value.

Mr. Dee, who has been president of the Superior Rock Springs Coal Company, will be active president of the Ideal Coal Company. Mr. Bletcher will handle production, while President Dee will devote his attention chiefly to sales.

Another operation has been opened in Schuylkill County, Pa., known as the Westwood mine of the Hazel Brook Coal Company, of Hazleton. Slopes have been sunk and a large modern breaker erected on what is one of the few remaining virgin coal areas in the state. The operation is in the town of Juliette.

Suit to recover \$38,180.78 from the city of Pittsburgh has been filed by the Valley Camp Coal Company to collect money for the delivery of coal during 1922. It is said the company agreed to furnish the city coal at \$3 a ton, and that before the year was ended a strike tied up their mines and they were forced to get coal elsewhere at a higher rate than \$3 a ton.

The Indiana Coal Producers' Association, comprising the strip-mine operators of the state, have signed a two-year wage agreement with the officers of District No. 11 of the United Mine Workers. This contract, said to be a renewal of the Jacksonville rates with modifications in conditions, has been the subject of negotiations between miners and operators since April 7.

Island Creek Builds

Contracts are to be awarded soon by the Island Creek Coal Company for the construction of tipples and other necessary structures for one of the largest mines in the states, expenditures between \$1,000,000 and \$2,000,000 being contemplated. The contracts call for the construction of tipples, the building of houses, the paving of streets, and the hard surfacing of 7 miles of road to connect the new mining town with Holden, general operating headquarters of the company. The new mine will be known as Operation No. 22. Two 400-foot shafts which will serve the mine are now nearly completed. The Chesapeake & Ohio is rapidly completing the 4-mile extension of the Pine Creek branch which is to provide an outlet for the coal produced. The Island Creek Company is completing 3 miles of siding. By October it is planned to have the road surfaced and the mine in operation.

Consolidation Changes

Numerous changes have been made in the operating personnel of the Consolidation Coal Company. R. L. Melendy has been named as general manager of operations with headquarters in Fairmont. T. G. Fear became production manager for all of the divisions of the company, succeeding G. W. Hay, resigned. M. S. Murray was named as engineer of transportation. Fred Bedale was appointed engineer of safety. Another appointment was that of Charleston Shinn, of Fairmont, as acting division engineer of the West Virginia division of the mining engineering department, with full authority and supervision over the department.

It has been indicated that the Consolidation Coal Company will have to provide additional office space in its office building at Fairmont, although when the building was completed and first occupied it amply sufficed for the needs of the company, but the growth in business and personnel as well as the concentration of more operating departments at Fairmont has made the present building inadequate.

The Thompson Coal Company has let a contract for the construction of about 1½ miles of spur road, including side tracks to a coal operation on the Coal & Iron Railroad (now W. Md. Railroad), near Elkins, W. Va. The plant will be near the abandoned lumber town of Montes, a few miles from this city, and will open up a huge field of excellent New River coal. Up to date tipples will be built, as well as an incline to reach the three seams of coal which it is understood this company will operate.

Nonunion Operators Win Decision

A decree enjoining officers of the United Mine Workers of America from interfering with business of nonunion coal companies in the southern part of West Virginia has been upheld by the United States Circuit Court of Appeals at Richmond. The district court at Charleston, W. Va., had granted the injunction.

The principal point involved was whether interference with coal mining interfered with interstate commerce. The appeals court held interstate trade was interfered with, since 90 percent of the 40,000,000 tons mined annually by the 316 plaintiff companies was shipped out of West Virginia. The court further held that strikes called by the union in nonunion fields in 1920 and 1922 were merely carrying out a conspiracy in restraint of trade.

Kentucky Coal Movement Larger

Coal production is increasing since the strike in the central competitive fields, and indications point to continued activity throughout the Elkhorn-Hazard coal fields, according to advices from Whitesburg, Ky. This is expected to be the best year in the coal industry since the World War. There are a number of large lake orders now being filled, which will continue all summer. Within the past few days a number of railroad contracts have been closed for the year. This will necessitate full operation of the mines through the present year.

Louisville & Nashville Railroad is taxed to the limit to handle the large output now going out from the territory comprising the Elkhorn-Hazard fields. Business is gradually improving.

The John P. Gorman Coal Co., which purchased the plant of the Old Commercial Coal Mining Co., at Glenco, near Ulvah, in Letcher County, Ky., is arranging to start up the mines at once. Within the next few weeks it is expected that these mines will be in full operation. These mines are the Louisville & Nashville Railroad's main line.

Seek Lost Anthracite Veins

Pardee Brothers Company, Inc., which operates the Lattimer, Milnesville, and Hollywood collieries, in Lucerne County, it is announced, will put several diamond drills to work at once in the section west of Hollywood in an effort to find traces of the anthracite veins which vanished at the edge of the Hollywood basin. Anthracite engineers have been studying the disappearance of these veins and several are confident they will be found again further on. Drilling also has been started by the Lehigh Valley Coal Company for new veins in and near Eckley.

The J. D. Walker Coal Company has let the contract to the Allender Construction Company, of Elkins, W. Va., for the erection of a large coal tippie, bins, incline, houses, etc., upon their large coal tract adjoining the Thompson coal field, work upon this plant already being under way. The railroad sidings have already been installed.

A new steel tippie, which will have a capacity of about 2,500 tons a day, is being constructed by the Bertha Consumers Company at its Wellburg, W. Va., plant. It will be equipped with all modern devices, capable of producing all grades of prepared coal, and will be finished in July.

Furnace Gap Mines Sold

The Mary Frances Coal Company, a \$75,000 incorporation, has taken over the properties of the Furnace Gap Coal Company at Hima (Clay County), Ky., which is located on the L. & N. Railroad. The output of this mine was formerly sold through the Kentucky Fuel Company, of Cincinnati, Ohio, under the trade name of "Columbia." The Mary Frances Coal Company is owned by Lee Congleton and his sons, who are also the owners and operators of the Fayette Jellico Coal Company at Anchor, Ky. The officers of the new company are as follows: E. W. Congleton, president; Isaac Congleton, vice president; Joe Congleton, secretary and treasurer; Lee Congleton, general manager.

Pittsburgh Mines Resume on Open-Shop Basis

Following the statement of the Pittsburgh Terminal Coal Corporation that when it resumed operations at its five mines in the Pittsburgh field it would be as an open-shop operation was the announcement of the Vesta Coal Company, the fuel department of the Jones and Laughlin Steel Company, that when it was ready to resume production it would be on an open-shop basis, as the Mine Workers' union had forced such a step. These are two of the largest workings remaining union in the field. There is no immediate plan for resumption, however, as both companies report the need for coal not pressing. The Vesta Company officials state that they have sufficient coal stocked and available to carry on mill operations indefinitely. The Pittsburgh Coal Company, after a brief period of attack on the part of pickets at its 18 operating mines in the field, not only resumed production on its former basis but increased both men and production before the end of the week.

PRODUCTION OF SLAB AND ROLLED ZINC IN 1926

THE production of slab zinc at zinc reduction plants in the United States in 1926 amounted to 659,221 short tons, valued at \$98,883,000, according to statistics compiled by the United States Bureau of Mines. This production consisted of 611,991 tons of

primary metal made from domestic ore; 6,431 tons of primary metal made from Mexican ore; and 40,799 tons of re-distilled secondary metal. The production in 1926 exceeded the production in 1925 by 47,094 tons, or 8 percent.

| SLAB ZINC PRODUCED IN THE UNITED STATES, 1923-26 (In short tons) | | | | |
|------------------------------------------------------------------|--------------|--------------|--------------|--------------|
| | 1923 | 1924 | 1925 | 1926 |
| Total output: | | | | |
| Primary | 510,434 | 517,339 | 572,946 | 618,422 |
| Redistilled secondary | 39,434 | 35,486 | 39,181 | 40,799 |
| | 549,868 | 552,825 | 612,127 | 659,221 |
| Primary zinc by origin: | | | | |
| Domestic ore | 508,335 | 515,831 | 555,631 | 611,991 |
| Foreign ore (total) | 2,099 | 1,508 | 17,315 | 6,431 |
| Canada | | 1,396 | 7,997 | |
| Mexico | 2,099 | 112 | 9,318 | 6,431 |
| Total | 510,434 | 517,339 | 572,946 | 618,422 |
| Primary zinc by method of reduction: | | | | |
| Distillation: | | | | |
| Arkansas | 29,870 | 28,447 | 27,145 | 32,712 |
| Illinois | 93,239 | 93,370 | 109,672 | 110,381 |
| Kansas | 32,006 | 28,640 | 25,765 | 33,671 |
| Oklahoma | 119,744 | 118,487 | 133,906 | 136,560 |
| Pennsylvania | 82,003 | 83,016 | 99,899 | 100,538 |
| Other States | 82,484 | 87,886 | 92,555 | 92,964 |
| Electrolytic: | | | | |
| Montana | 71,088 | 77,493 | 79,004 | 111,596 |
| Total | 510,434 | 517,339 | 572,946 | 618,422 |
| Grade A | 89,739 | 108,238 | 111,964 | 143,224 |
| Grade B | 58,513 | 48,874 | 49,198 | 48,169 |
| Grade C | 90,459 | 100,290 | 81,176 | 84,689 |
| Grade D | 511,157 | 298,423 | 369,789 | 383,139 |
| Total | 549,868 | 552,825 | 612,127 | 659,221 |
| Average selling value per pound: | | | | |
| Grade A | 7.1 | 6.8 | 7.85 | 7.65 |
| Grade B | 7.1 | 6.8 | | |
| Grade C | 6.7 | 6.4 | 7.56 | 7.44 |
| Grade D | 6.7 | 6.4 | | |
| All grades | 6.8 | 6.5 | 7.6 | 7.50 |
| Total value of output | \$74,782,000 | \$71,867,000 | \$93,043,000 | \$98,883,000 |
| Zinc dust | 8,052 | 7,957 | 8,314 | 7,994 |

* States in which zinc was reduced from ore, part of which originated in other states.

APPARENT CONSUMPTION OF PRIMARY ZINC IN THE UNITED STATES, 1923-26 (In short tons)

| | 1923 | 1924 | 1925 | 1926 |
|-------------------------|---------|---------|---------|---------|
| Supply: | | | | |
| Stock January 1— | | | | |
| In bonded warehouse | 80 | 80 | | |
| At smelters | 16,810 | 27,808 | 20,754 | 13,080 |
| Production— | | | | |
| Domestic slabs | 452,502 | 454,799 | 484,499 | 525,657 |
| Domestic rolled zinc | 55,833 | 61,032 | 71,132 | 86,334 |
| Foreign slabs | 2,099 | 1,508 | 17,315 | 6,431 |
| Imports | 21 | 25 | 22 | |
| Total available | 527,345 | 545,252 | 593,724 | 631,524 |
| Withdrawn: | | | | |
| Exports— | | | | |
| Foreign, from warehouse | 7,080 | † | † | † |
| Foreign, under drawback | | | | |
| Domestic slabs | 42,181 | 72,588 | 76,351 | 42,921 |
| Domestic sheets | 3,782 | 3,658 | 4,196 | 4,641 |
| Stock December 31— | | | | |
| In bonded warehouse | 80 | * | | |
| At smelters | 27,808 | 20,754 | 13,080 | 26,937 |
| Total withdrawn | 80,831 | 96,995 | 93,627 | 74,499 |
| Apparent consumption | 446,514 | 448,257 | 500,097 | 557,025 |

| RETORT CAPACITY OF PRIMARY ZINC SMELTERS IN THE UNITED STATES, 1923-26 | | | | |
|------------------------------------------------------------------------|---------|---------|---------|---------|
| | 1923 | 1924 | 1925 | 1926 |
| Total retorts at active plants | 140,352 | 134,160 | 121,120 | 122,404 |
| Retorts in operation at end of year | 86,670 | 81,435 | 95,460 | 89,496 |

| IMPORTS AND EXPORTS OF ZINC ORE, IN SHORT TONS, 1923-26 | | | | |
|------------------------------------------------------------|-------|-------|---------|---------|
| | 1923 | 1924 | 1925 | 1926 |
| Zinc ore imported, zinc content | 3,223 | 4,649 | 13,536 | 14,567 |
| Zinc ore exported, gross weight | 2,804 | 368 | 168,951 | 195,252 |
| Zinc ore remaining in warehouse, December 31, zinc content | 868 | 6,052 | 20,469 | 13,790 |

* 998 pounds. † Included with domestic. ‡ Includes 40,000 tons of concentrates from Joplin region in 1925, and about 20,000 tons in 1926.

| ROLLED ZINC IN THE UNITED STATES, 1925-26 | | | | | | |
|------------------------------------------------------|-------------|-------------|--------------|-------------|-------------|--------------|
| | 1925 | | | 1926 | | |
| | Pounds | Total | Value Av. | Pounds | Total | Value Av. |
| Sheet zinc not over one-tenth inch thick.. | 60,169,425 | \$6,195,763 | \$0.103 | 59,866,845 | \$6,478,927 | \$0.108 |
| Boiler plate and sheets over one-tenth inch thick | 2,202,347 | 199,435 | .091 | 2,469,614 | 239,215 | .097 |
| Strip and ribbon zinc..... | 79,892,173 | 8,119,036 | .102 | 110,331,839 | 11,162,759 | .101 |
| Total zinc rolled..... | 142,263,945 | 14,514,234 | .102 | 172,668,298 | 17,880,901 | .104 |
| Sheet zinc imported for consumption.... | 349 | 55 | .158 | 352 | 46 | .131 |
| Rolled zinc exported..... | 8,892,707 | 926,841 | .110 | 9,281,465 | 1,086,967 | .117 |
| Available for consumption..... | 133,871,587 | | | 163,387,185 | | |

The states having the largest output of primary metal were: Oklahoma, with 136,560 tons; Montana, with 111,596 tons; Illinois, with 110,381 tons; and Pennsylvania, with 100,538 tons. The remainder of the output, 159,347 tons, was smelted in Arkansas, Indiana, Kansas, Texas, and West Virginia.

The apparent consumption of primary zinc in the United States in 1926 amounted to 557,025 tons, an increase of nearly 57,000 tons over the apparent consumption in 1925.

ROLLED ZINC

Rolled zinc produced in the United States in 1926 amounted to 172,668,298 pounds, valued at \$17,880,901. These figures, which were compiled from reports made by producers to the Bureau of Mines, show a gain of 21 percent in quantity and 23 percent in value of output, as compared with 1925. The greatest increase was made in strip and ribbon zinc. Total exports of rolled zinc increased 11 percent.

The average selling value of rolled zinc was 10.4 cents a pound in 1926, compared with an average selling value of 10.2 cents in 1925. Market quotations on sheet zinc, f. o. b. mill, ranged from 11.25 cents to 12 cents a pound during the year; at the end of the year the quotation was 11.50 cents.

MAGNESIUM PRODUCTION IN 1926

SALES of magnesium produced in the United States in 1926 amounted to 322,650 pounds, valued at \$390,400, as compared with sales of 245,000 pounds, valued at \$274,400 in 1925, according to James M. Hill, of the United States Bureau of Mines.

Over 73 percent of the magnesium was sold in ingot form at prices ranging from 69 cents to 98 cents a pound, and such sales increased nearly 19 percent as compared with 1925. Sales of castings in 1926 were 36,940 pounds and were over 11 times greater than in 1925. Sales of wire and tubing increased fourfold as compared with 1925, but sales of sheet were nearly 9,000 pounds less than those in the previous year. The average price of domestic ingot metal in 1926 was 80 cents a pound, that of powder \$1.64 a pound, and of castings \$2.57 a pound.

Imports of magnesium metal in 1926 were 10,117 pounds, valued at \$4,660, as compared with 8,326 pounds, valued at \$7,070 in 1925.

Colorado, it is said, has more coal than Ohio and Pennsylvania combined, and the opening of the Moffat tunnel will provide for the distribution of the coal and make Colorado one of the greatest and most resourceful in the union.

THE FLUORSPAR INDUSTRY IN 1926

AS was to be expected in a year in which there was a record production of steel, the fluorspar industry did a larger volume of business in 1926 than in 1925, according to a statement prepared by Hubert W. Davis, of the United States Bureau of Mines. The increase of 13 percent in shipments made by domestic producers, however, did not keep pace with the imports of fluorspar, which increased 55 percent over 1925 and are the largest on record.

The fluorspar shipped from mines in the United States in 1926 amounted to 128,657 short tons and was valued at \$2,341,277, as compared with 113,669 tons, valued at \$2,052,342, in 1925. Thus there was an increase of 13 percent in quantity and 14 percent in total value as compared with 1925. Illinois, Colorado, and New Mexico each shipped less fluorspar than in 1925, but Kentucky not only shipped the second largest quantity ever recorded for that State but for the second time since 1904 the shipments exceeded those of Illinois.

The reported shipments of fluorspar to manufacturers of steel, glass, and enamel and sanitary ware were more than in 1925 and the quantity exported was twice as much as in the preceding year, but there were decreases in the reported shipments to foundries and to manufacturers of hydrofluoric acid.

The general average value per ton f. o. b. shipping points for all grades of fluorspar in 1926 was \$18.20, which is only slightly higher than the average for 1925, which was \$18.06.

The following tables show the details of the shipments of fluorspar by states, by kinds, and by uses for 1925 and 1926:

STOCKS AT MINES

According to the reports of producers the stocks of fluorspar at mines or at shipping points on December 31, 1926, amounted to 17,912 short tons of gravel fluorspar, 1,987 tons of lump fluorspar, and 832 tons of ground fluorspar, a total of 20,731 tons of "ready-to-ship" fluorspar. In addition there was in stockpiles at mines at the close of 1926 about 48,000 short tons of crude (run of mine) fluorspar which must be milled before it can be marketed and which is calculated to be equivalent to about 28,000 tons of merchantable fluorspar. These stocks compare with 22,551 tons of "ready-to-ship" fluorspar and 44,335 tons of crude fluorspar on December 31, 1925. Thus the stocks of merchantable fluorspar were slightly decreased but the stocks of crude fluorspar were increased somewhat.

IMPORTS

Noteworthy features of the imports of fluorspar in 1926 are the importation from Spain, a new source, the increase of 340 percent in the imports from France, the resumption of imports from Canada, and the decrease of 68 percent in the imports from Italy.

The United Kingdom, as usual, was the chief source of the imports, supplying about 39 percent of the total in 1926. The greater part of the fluorspar from the United Kingdom was sold for use in steel plants and foundries. Germany furnished 27 percent of the total fluorspar imports in 1926, which was 75 percent more than in 1925. The United Kingdom and Germany together contributed about 66 percent of the total

imports in 1926. Most of the fluorspar received from Germany in 1926 was sold for use in the iron and steel industry, but some was sold to manufacturers of ceramics and hydrofluoric acid.

The total imports of fluorspar into the United States in 1926, amounting to 75,671 short tons, represent an increase of 55 percent over 1925 and are the largest ever recorded. The imports in 1926 are equivalent to 59 percent of the total domestic shipments of fluorspar, as compared with 43 percent in 1925.

The following table shows the imports of fluorspar into the United States by countries for 1925 and 1926:

FLUORSPAR IMPORTED INTO THE UNITED STATES, 1925-26, BY COUNTRIES, IN SHORT TONS*

| (General imports) | | | |
|-----------------------------|--------|--------|--|
| Country | 1925 | 1926 | |
| Africa: | | | |
| British South | 7,906 | 7,534 | |
| British West | | 610 | |
| Portuguese East | | 362 | |
| Belgium | 78 | 31 | |
| Canada | | 1,109 | |
| China | 569 | 645 | |
| Czechoslovakia | 27 | | |
| France | 2,537 | 11,163 | |
| Germany | 11,680 | 20,465 | |
| Italy | 4,278 | 1,379 | |
| Soviet Russia in Asia | | 18 | |
| Spain | | 2,948 | |
| United Kingdom | 21,635 | 29,407 | |
| | 48,700 | 75,671 | |

* Figures compiled from records of the Bureau of Foreign and Domestic Commerce and those for 1926 subject to revision.

FLUORSPAR CONSUMED AND STOCKS AT CONSUMERS' PLANTS

The figures on consumption of fluorspar in 1926 and stocks at consumers' plants on December 31, 1926, given in the following table, while not including data from all consumers, are believed to fall not far short of the total for the United States. Thus, the figures on consumption and stocks represent plants that make about 99 percent of the total basic open-hearth steel and about 90 percent of the total electric-furnace steel made in the United States. The proportional representation of users of fluorspar in the other industries listed is not known precisely, but reports on consumption and stocks of most of the chief consumers are included in the table.

The data furnished by manufacturers of steel by the basic open-hearth process show that they consumed 140,449 short tons of fluorspar in 1926 and had stocks on hand amounting to 69,369 short tons on December 31, 1926. When the consumption and stocks of all companies are included it is believed the total consumption by basic open-hearth steel companies will be in the neighborhood of 142,000 short tons and the stocks will total about 70,000 short tons. These stocks are the largest recorded since such statistics have been collected by the United States Bureau of Mines. The general average consumption of fluorspar per ton of basic open-hearth steel

FLUORSPAR SHIPPED FROM MINES IN THE UNITED STATES, 1925-26, BY STATES

| State | Short tons | 1925 | | Short tons | 1926 | |
|------------------|------------|-------------|---------|------------|-------------|---------|
| | | Total | Average | | Total | Average |
| Illinois | 54,428 | \$1,024,516 | \$18.82 | 53,734 | \$1,012,879 | \$18.85 |
| Kentucky | 44,826 | 833,794 | 18.60 | 62,494 | 1,167,129 | 18.68 |
| Colorado | 11,776 | 153,707 | 13.05 | 12,420 | 161,260 | 12.98 |
| New Mexico | 2,639 | 40,325 | 15.28 | | | |
| | 113,669 | 2,052,342 | 18.06 | 128,657 | 2,341,277 | 18.20 |

FLUORSPAR SHIPPED FROM MINES IN THE UNITED STATES, 1925-26, BY KINDS

| Kind | Short tons | 1925 | | Short tons | 1926 | |
|--------------|------------|-------------|---------|------------|-------------|---------|
| | | Total | Average | | Total | Average |
| Gravel | 97,395 | \$1,611,283 | \$16.54 | 112,092 | \$1,868,854 | \$16.67 |
| Lump | 6,697 | 132,178 | 19.74 | 5,292 | 108,710 | 20.54 |
| Ground | 9,577 | 308,881 | 32.25 | 11,273 | 363,713 | 32.26 |
| | 113,669 | 2,052,342 | 18.06 | 128,657 | 2,341,277 | 18.20 |

FLUORSPAR SHIPPED FROM MINES IN THE UNITED STATES, 1925-26, BY USES

| Use | Short tons | 1925 | | Short tons | 1926 | |
|--------------------------------|------------|-------------|---------|------------|-------------|---------|
| | | Total | Average | | Total | Average |
| Steel | 91,760 | \$1,482,461 | \$16.16 | 105,614 | \$1,744,085 | \$16.51 |
| Foundry | 6,275 | 121,177 | 19.31 | 6,212 | 121,458 | 19.55 |
| Glass | 6,767 | 211,331 | 31.23 | 7,507 | 240,288 | 32.01 |
| Enamel and sanitary ware | 3,237 | 101,060 | 31.22 | 3,410 | 113,445 | 33.27 |
| Hydrofluoric acid | 4,455 | 114,059 | 25.60 | 3,410 | 79,106 | 23.20 |
| Miscellaneous | 120 | 4,680 | 39.00 | 372 | 7,986 | 21.47 |
| Exported | 1,055 | 17,574 | 16.66 | 2,132 | 34,915 | 16.38 |
| | 113,669 | 2,052,342 | 18.06 | 128,657 | 2,341,277 | 18.20 |

made showed a decrease for the third consecutive year, amounting to 7.2 pounds in 1926, as compared with 7.4 pounds in 1925, 7.8 pounds in 1924, and 8.1 pounds in 1923.

Alloy-steel manufacturers are the chief users of fluorspar in making steel by the electric-furnace process, the companies from which reports were received showing a consumption of 4,177 short tons of fluorspar in 1926 and stocks on hand on December 31, 1926, amounting to 1,853 short tons. Making allowance for the consumption by the companies not reporting, the total would probably not exceed 5,000 short tons. The general average consumption of fluorspar

per ton of electric-furnace steel made by the plants using fluorspar was 23 pounds in 1926.

FLUORSPAR REPORTED CONSUMED AND IN STOCK IN THE UNITED STATES IN 1926, BY INDUSTRIES

| Industry | Companies reporting | Fluorspar consumed (short tons) | Stocks at consumers' plants December 31 (short tons) |
|---------------------------|---------------------|---------------------------------|------------------------------------------------------|
| Basic open-hearth steel.. | 72 | 140,449 | 69,369 |
| Electric-furnace steel... | 54 | 4,177 | 1,853 |
| Foundry | 60 | 3,924 | 1,377 |
| Ferroalloys | 4 | 248 | 80 |
| Hydrofluoric acid | 5 | 7,591 | 12,153 |
| Enamel and sanitary ware | 69 | 6,671 | 935 |
| Glass | 42 | 7,954 | 1,335 |
| Miscellaneous | 14 | 719 | 252 |
| | .. | 171,733 | 87,854 |

MINERAL PRODUCTION OF THE DIFFERENT STATES

A COMPILATION of mineral production by States, covering the year 1925, made by the United States Bureau of Mines emphasizes the generally unrealized fact that certain Eastern States contributed tremendously to the nation's mineral output. The compilation also evidences the overwhelming preponderance of coal and oil as factors in the nation's mineral production.

Pennsylvania, with its enormous coal production, leads all of the states, with a total mineral output in 1925 of \$867,196,000. Oklahoma, with an output of \$501,767,000, mainly petroleum, was the second state. California ranked third,

with a total mineral production of \$496,923,000, largely made up of petroleum. Texas, another tremendous oil producer, ranked fourth, with a production amounting to \$351,212,000. West Virginia, with an output of \$333,528,000, ranked fifth, and here again coal was the big factor.

The following table gives the total mineral output of the different states, with the principal minerals constituting the production. In this compilation iron ore, not pig iron, is taken as the basis of valuation of iron. In the case of other metals mine production—that is, the recoverable content of the metals—is the basis used:

| State | Principal Mineral Products | Amount |
|---------------------------|------------------------------------------------------|---------------|
| Pennsylvania..... | Coal, cement, clay products, natural gas..... | \$867,196,000 |
| Oklahoma..... | Petroleum, zinc, natural gas..... | 501,767,000 |
| California..... | Petroleum, natural gas, cement..... | 496,923,000 |
| Texas..... | Petroleum, natural gas, sulphur..... | 351,212,000 |
| West Virginia..... | Coal, natural gas, petroleum, clay products..... | 333,528,000 |
| Ohio..... | Clay products, coal, natural gas, petroleum..... | 247,507,000 |
| Illinois..... | Coal, clay products, petroleum, cement..... | 231,680,000 |
| Kansas..... | Petroleum, zinc, coal, cement..... | 142,944,000 |
| Kentucky..... | Coal, petroleum, clay products, natural gas..... | 131,371,000 |
| Michigan..... | Iron ore, copper, cement, salt..... | 122,212,000 |
| Arizona..... | Copper, silver, gold, lead..... | 114,203,000 |
| Indiana..... | Coal, cement, stone, clay products..... | 111,834,000 |
| Minnesota..... | Iron ore, stone, cement, clay products..... | 110,253,000 |
| New York..... | Clay products, gypsum, cement, stone..... | 102,036,000 |
| Utah..... | Copper, lead, silver, coal..... | 100,275,000 |
| Missouri..... | Lead, clay products, cement, coal..... | 92,548,000 |
| Arkansas..... | Petroleum, natural gas, coal..... | 87,186,000 |
| Montana..... | Copper, silver, zinc, coal..... | 79,261,000 |
| Wyoming..... | Petroleum, coal, natural gas..... | 78,755,000 |
| Alabama..... | Coal, iron ore, cement, clay products..... | 77,139,000 |
| New Jersey..... | Clay products, zinc, cement, sand and gravel..... | 76,764,000 |
| Colorado..... | Coal, gold, lead, zinc..... | 63,149,000 |
| Louisiana..... | Petroleum, sulphur, natural gas..... | 60,504,000 |
| Virginia..... | Coal, clay products, stone, gypsum..... | 41,038,000 |
| Tennessee..... | Coal, cement, clay products, stone..... | 38,869,000 |
| Iowa..... | Coal, cement, gypsum, clay products..... | 38,420,000 |
| Idaho..... | Lead, silver, zinc, copper..... | 31,611,000 |
| Nevada..... | Copper, silver, gold, lead..... | 26,470,000 |
| New Mexico..... | Copper, coal, petroleum, zinc..... | 25,549,000 |
| Washington..... | Clay products, clay products, sand and gravel..... | 22,382,000 |
| Maryland..... | Coal, cement, clay products, sand and gravel..... | 21,558,000 |
| Wisconsin..... | Stone, zinc, sand and gravel, iron ore..... | 19,205,000 |
| Alaska..... | Copper, gold, silver, coal..... | 18,286,000 |
| Massachusetts..... | Stone, clay products, sand and gravel, lime..... | 16,832,000 |
| Florida..... | Phosphate rock, stone, sand, fuller's earth..... | 16,651,000 |
| Georgia..... | Clay products, stone, cement, fuller's earth..... | 16,504,000 |
| Vermont..... | Stone, slate, lime, talc..... | 14,409,000 |
| North Carolina..... | Clay products, stone, sand and gravel, feldspar..... | 9,504,000 |
| South Dakota..... | Gold, sand and gravel, stone, gypsum..... | 7,972,000 |
| Oregon..... | Cement, sand and gravel, stone, clay products..... | 7,827,000 |
| Connecticut..... | Clay products, stone, lime, sand and gravel..... | 6,755,000 |
| Maine..... | Stone, lime, clay products, slate..... | 5,839,000 |
| South Carolina..... | Clay products, stone, sand and gravel, barite..... | 3,608,000 |
| New Hampshire..... | Stone, clay products, sand and gravel, feldspar..... | 3,465,000 |
| Nebraska..... | Cement, sand and gravel, clay products, stone..... | 3,359,000 |
| North Dakota..... | Coal, clay products, sand and gravel..... | 2,662,000 |
| Mississippi..... | Sand and gravel, clay products, stone..... | 2,172,000 |
| Rhode Island..... | Stone, clay products, sand and gravel, lime..... | 1,152,000 |
| District of Columbia..... | Sand and gravel, clay products, stone..... | 955,000 |
| Delaware..... | Clay products, stone, sand and gravel..... | 539,000 |

POTASH DRILLING

CONTRACTS for the drilling of two additional potash test wells in southeastern New Mexico have been awarded by the Bureau of Mines, to the Sullivan Machinery Company, of Chicago. Drilling operations are to start before May 15. Both new locations, which are recommended by the Geological Survey as giving favorable indications of the existence of potash beds, lie in Eddy County, near Carlsbad.

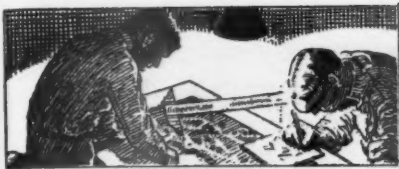
The depth to the top of the salt beds at these locations is estimated at about 500 feet. Drilling will be continued to a depth of 1,000 or 1,500 feet, as conditions may determine, this allowing penetration of most of the estimated thickness of the salt beds in this region.

The drilling of potash well No. 1 was completed April 9, at a depth of 1,847 ft., drilling operations having been in progress since February 21. At this location, the hole penetrated the salt beds at a depth of about 850 ft., and various favorable showings of potash-bearing salts were encountered. To a depth of 150 ft., coring of the soft "red beds" overlying the salt formation, with equipment consisting of a standard bit and single-tube core-barrel, was attempted unsuccessfully. From 150 ft. to the bottom of the hole a specially designed bit and double-tube core-barrel were used and 1,600 ft. of core, amounting to 94 percent, was recovered.

The cores taken from potash well No. 1 have been turned over to the Geological Survey for study and analysis. Detailed information as to their composition will be announced later. At this well, the casing has been pulled and the hole plugged with cement with a view to affording protection against surface and underground waters, to possible future potash-mining operations.

POTASH IN 1926

POTASH produced in the United States in 1926 amounted to 46,324 short tons of crude potash salts containing 23,366 short tons of potash (K_2O), according to the United States Bureau of Mines. Sales by producers amounted to 51,369 tons of crude potash containing 25,060 tons of K_2O . The potash materials of domestic origin, sold by producers in 1926, were valued at \$1,083,064 f. o. b. plants. About 26,000 tons of crude potash with an available content of 9,000 tons of K_2O remained in producers' stocks December 31, 1926. The production was chiefly from natural brines in California and distillery residue from molasses in Maryland. Small amounts were also obtained from steel plant dust in Pennsylvania, alunite in Utah, and glauconite in Delaware.



WITH THE MANUFACTURERS



New Step-Back Relay

A new step-back relay introduced by the General Electric Company is designed for use in direct current magnetic control equipment to provide overload protection and to allow a suitable time delay before reset.

This relay is a combination of two more or less distinct parts. The upper part consists essentially of a normally closed contact whose open or closed position is controlled by a coil in series with the motor armature. Loads in excess of the relay setting cause this normally closed contact to open, dropping out the step-back and accelerating contactors and thereby inserting enough resistance to limit the motor current to 125 percent normal full load with stalled armature.

The lower part of the relay prevents the overload mechanism from resetting until after a definite time interval during which time the motor has a chance to become stabilized. If, after this definite time delay, conditions have again become normal and the motor current has decreased to a safe point, the overload mechanism resets and the control panel automatically accelerates the motor in the regular manner. However, unless the current decreases below a certain point, the relay will not be reset. In this event the motor will have to be disconnected from the line and restarted from rest.

The principal use for the new relay at present is on marine equipments for anchor windlasses and capstans, although it is expected to be of value wherever it is necessary to maintain the torque and at the same time provide overload protection.

The Federal "Triple-A" Siren

The Federal Electric "Triple-A" Siren for use as a fire alarm in villages, schools, mines, factories, and warehouses, is announced by the Federal Electric Co., 8700 South State Street, Chicago, Ill.

The Triple-A Siren is designed to serve also as a start-and-quit-work signal in mines and factories. It consists of three sirens mounted on a triangular base, connected in parallel and operated from one push button switch. Each siren has approximately one-third horsepower.

The tone of each of the three sirens is different from that of the other two,

giving a combination of three tones. With a siren mounted on each angle of the triangular base, the Triple-A has a sound radius of from three-eighths to one-half mile under normal conditions.

The upkeep of the Triple-A, it is claimed, is practically negligible, is extremely simple in construction and is built of the best materials, entirely enclosed. The motor-housings, stators, and rotors are die cast from high-grade aluminum. The horns and weather housings over the motor cases are seamless deep spun. The entire unit is finished in red Duco and weighs but 40 pounds.

erated with one hand. Slight pressure against a fitting opens its valve and allows the lubricant to pass. The hose may be attached to a pump installed in the original barrel of lubricant, to a portable large volume compressor (as is shown in accompanying photograph), or to a large steam compressor holding 100 pounds of lubricant.

One of the first mines to adopt this new Alemite method of lubrication was the Roden Coal Co., in Alabama, which has 1,000 mine cars. In addition to eliminating waste of lubricant it has been found that two men can average lubri-



A New Way to Lubricate Mine Cars

An entirely new system of mine car lubrication has been developed by the Bassick Manufacturing Co., Chicago, Ill., makers of Alemite Lubrication equipment for automobiles and industrial machinery.

The system employs a sturdy, flush type fitting, inside of which is a ball check valve which prevents dirt or grit from entering the bearing. As a prevention against the mouth of the fitting collecting dirt a special "yankee drill" cleaner is provided for use at the time of lubrication.

Lubricant is applied by a special nozzle on the end of a flexible hose, inserted in the special mine car fitting. This nozzle is shaped like a piston and is op-

erating 50 cars an hour, using two hose outlets from the large sized Alemite Steam Compressor. The Roden mine now lubricates its entire rolling stock in two days. Formerly it took 10 men and an overseer from 9 to 12 days to do the same work. A foremost advantage is that the system uses solidified lubricant which does not leak out of the bearings.

Hex-Top Grease Cups Furnished With Alemite Fittings

Of interest to all manufacturers whose processes or fabrication require the use of grease cups, should be the announcement of Link-Belt Co., of Chicago, Indianapolis, and Philadelphia, which describes their new "Hex-Top" Malleable

Iron Compression Grease Cup with ale-mite, or zerk fittings.

The trade name "Hex-Top," describes very aptly the shape of the grease cup head. Six-sided, it offers, for turning, an easy purchase for any type of wrench, and a good grip for the hand.

The combination of compression grease cup and Alemite fitting is a distinct improvement over either article used separately.

An example of this would be in the lubricating system of a long belt conveyor using many grease cups for the idlers: here the easiest, quickest, and most economical way to fill all the cups at one time, it is said, is with a grease gun applied to the ale-mite fitting, when the cap is turned up to a high point, but not entirely unscrewed or removed.

The filling can be done without waste of grease, and without any inconvenience; the cup holds a good reserve for use of the compression feature; and an occasional slight screwing down by hand or wrench is all that is necessary until it is time to have a general refilling of the cups.

If a bearing gets warm when the grease gun is not at hand, a turn or so of the cap takes care of the emergency.

How-To Socket Wire Rope

"In socketing a wire rope," states the American Cable Co., "measure back from the end of the rope a distance equal to the length of the tapered basket of the socket. Tie securely at this point with soft iron annealed wire and add two additional tie wires below the first.

"Open up the strands and cut out the hemp core as far down toward the tie wire as possible. Unlay each wire and straighten so as to form a 'brush.' On large ropes and heavy wires it would be necessary to place a small pipe over each wire to straighten or approximately remove the curl from the wire.

"If the wires are very greasy, hold the 'brush' over a pail of gasoline (with the wires held downward), and wipe off the grease with waste or a paint brush dipped in the gasoline. Wipe dry, using a clean rag or piece of waste.

"Dip the 'brush' still holding the wires point down, into a pot of muriatic acid solution (50 percent water and 50 percent commercial acid). Insert the brush to a depth so as not to immerse the end of the hemp core. Keep in the acid until the wires are clean. Still holding the wires downward, withdraw from the acid and knock the rope sharply with a stick (broomstick or hammer handle).

"Place a temporary tie wire over the ends of the brush taking care not to handle the cleaned wires with greasy hands or tools. Insert the rope end into the socket, then cut the temporary tie

This bearing, the largest ever built in the Timken plant, is to be installed in the largest compeb mill in the world. This is to operate in a plant manufacturing Portland cement



The Largest Timken Bearing Ever Built

THE largest bearings ever built by the Timken Roller Bearing Co. have just been completed and shipped, according to officials of the company. These bearings have a bore of 42 inches and an outside diameter of 61 9/16 inches. At 30 r.p.m. these bearings have a capacity of 2,750,000 pounds. The weight of each bearing is more than two tons.

Not only are these bearings the largest ever built in the Timken plant, but they will be installed by the Allis-Chalmers Manufacturing Co. in the largest compeb mill in the world. This will be put in service in a plant manufacturing Portland cement. This mill has a diameter of 10 feet and 9 feet by 45 feet long and is used to take the clinker from the cement kiln and grinding it to finished cement in one machine.

wire. Set the rope vertically in a vise; adjust the socket so that the wires come flush with the top of the basket of the socket, then spread the wires out. Seal the bottom of the socket with fire clay or asbestos. (If cold, warm the socket moderately.)

"Pour with pure zinc (not babbitt, lead or other alloy). Tap the side of the socket with light hammer while the zinc is still fluid, so as to jar the zinc into crevices between the wires. When cool, remove the fire clay and the serving wires, and the joint will result. It will help slightly in the flowing of the zinc among the wires to put a small quantity of sal ammoniac crystals over the wires just prior to pouring the zinc."

Howe Chain Co.'s Trucks Now Called "Jak-Tung" Trucks

The new trade name, "Jak-Tung," has recently been applied to the small, three-

The advantages of the Timken Bearing in this machine will be the material reduction of the overall length of the machine, since the width of the Timken Bearings is only 13 1/4 inches. Likewise, Timken Bearings may be adequately enclosed, which will obviate the necessity of renewing the lubricant supply except at infrequent intervals. The tapered construction of the bearing permits the carrying of all loads, regardless of direction without the use of thrust plates or special thrust bearings.

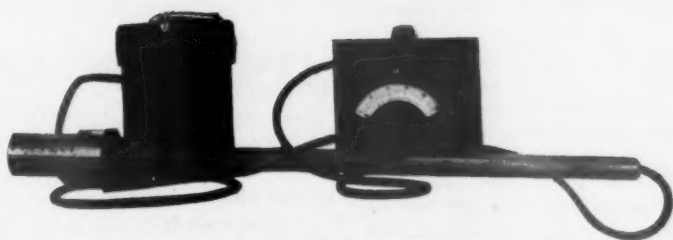
Bearings of unusual size and large capacity have been built for some time in the Timken plant and are used in many applications in steel mills, and other types of equipment where shafts of unusual size and loads of exceptional magnitude require bearings capable of withstanding the severe service for long periods without renewal.

wheeled truck manufactured by the Howe Chain Co., of Muskegon, Mich.

The "Jak-Tung" truck consists of a platform, equipped with two malleable iron wheels at the rear, and a malleable iron draw bar in the front. The jack tongue, from whence the truck takes its name (with wheel) hooks into the draw bar leg, and, by a downward thrust of the handle, the load is raised, and may be hauled anywhere.

Built in 17 different sizes and 3 models, with either steel or hardwood platforms or trays—in varied combinations—this truck obviously finds its greatest usefulness as a material conveyor in plants, handling loose, bulk, package, or heavy piece equipment up to 3 tons in weight.

Features claimed for the "Jak-Tung" truck are that, since materials are kept on wheels from one operation to the next, congestion and spoilage, in addition to the expense of double handling, are obviated.



NEW METHANE INDICATOR TESTED IN PENNSYLVANIA MINES

Working Test Of Latest Scientific Device In Price Pancoast Colliery Shows Greatest Contribution To Mining Industry In Past Century

WHAT is believed to be the greatest single contribution to the mine industry since the invention of the Davy safety lamp more than 100 years ago was successfully tested recently in the Price Pancoast colliery, at Throop, Pa. Those present at this important demonstration were:

Edward K. Judd and H. C. Stelling of the Union Carbide and Carbon Corporation; D. C. Ashmead, of Wilkes-Barre, consulting engineer and former engineer with the United States Bureau of Mines; H. S. Smith, consulting engineer of Wilkes Barre; J. R. Bryden, Jr., superintendent of the mine; S. Dorr, R. H. Gill, L. Winters and A. Pearson, foremen and fire bosses of the mine.

The demonstration was for the purpose of testing a new electrical device for detecting the deadly fire damp. It was perfected, after two years of research, in the laboratories of the Union Carbide and Carbon Corporation in Long Island City.

The workings where this test was made are in the Dunmore Number 2 seam, at the bottom of a 600-foot shaft. The party went to the water level of the Dunmore Bed, which is in the old and abandoned workings.

As the party approached the district in which the gas was known to exist, the leaders kept testing for fire damp, as did Mr. Judd who was operating the detector. Mr. Judd was able to announce the presence of methane with the detector before the veteran fire bosses could with their safety lamp. When methane was detectable by the safety lamp Mr. Judd gave the reading from the indicator of gas present in fractions of 1 percent. Samples of mine air taken at the time and analyzed by precise chemical methods, were found to check with indicated readings within 1/10 of 1 percent.

The instrument used in the Price Pancoast colliery test consists of a detector which can be mounted on a telescoping rod and can be raised to any desired height in the workings. The recording device which is operated from a storage battery attached to the belt of the fire boss, and is similar in size and weight to that used for electric cap lamps.

The new instrument consists of a platinum filament, glowing at a constant temperature, and enclosed by a system of protecting gauze screens. Increase in temperature, caused by an increasing percentage of combustible gases in the atmosphere, is instantly and automatically registered on a dial carried by the fire boss.

It was found in the Price Pancoast colliery test that when the amount of methane present was less than an explosive mixture then the needle on the recording device rose to the proper point and remained stationary. When the mixture of air and methane was at or above the explosive point the needle moved back and forth across the scale.

If a recording instrument has been used instead of a non-recording, then a series of long vertical lines would be shown on the dial. Also, if it was desired the instrument could have been so arranged that it would ring a bell giving warning of the presence of methane.

As the fire boss, equipped with an instrument of the recording type, makes his rounds and tests for gas, the amount of gas in each working place is recorded permanently on the dial, so that the mine foreman has a record of the inspection made by the fire boss. He also has a check on the amount of methane present in each working place, and by comparing the readings on the dial and the records as shown in the daily report of the fire boss he can tell whether it is safe to send workmen into that portion of the mine.

A further precaution can be taken. That is, to equip each place that the fire boss has had to inspect with a watchman's key and require him to insert the key in the nearest instrument each time he visits the place. In this way, an automatic record of his visit will be made at the same time he tests for the percentage of fire damp.

Another important use for the methane detector, probably as important as those mentioned above, is in the case of fire. If it is necessary to seal the fire then the methane detector becomes of great value, for if these detectors are placed at points within the seal it will

be possible to watch the conditions of the mine air, particularly relating to the amount of methane present, and to determine the possibility of this gas being exploded by contact with the fire.

When it is decided to open the seal to see if the fire is extinguished, the detector will again be of value for then it will be possible to watch the amount of methane present.

Annual Report of General Electric Co.

The annual report of the General Electric Co., shows the year 1926 to have been the most prosperous in the history of the company.

Sales billed amounted to \$326,974,104, compared with \$290,290,166 in 1925, an increase of more than \$36,000,000. The best previous high record was in 1924 when sales totaled \$299,251,869.

Orders received during 1926 amounted to \$327,400,207, an increase of 8 percent over 1925. The previous high record was \$318,470,438 in 1920.

Profit available for dividends on the common stock on the 1926 business was \$44,314,884, equivalent to \$6.14 per share on the 7,211,481 shares of no par value stock outstanding, as compared with \$20.49 per share in 1925 on the 1,802,870 shares of \$100 par value common stock then outstanding, which is equivalent to \$5.12 per share on the present stock. In August, 1926, four shares of no par value common stock were issued in exchange for each share of the old common stock.

This split-up of shares is reflected in an increase in the number of stockholders from 36,697 in December, 1925, to 46,305 in December, 1926. More than 98 percent of the stock is held in the United States and nearly half of the stockholders are women. Every state in the Union is represented in the list of stockholders.

A striking illustration of the company's contribution to the benefit of the consuming public and of its employees is contained in a statement showing that during the past 12 years, while commodity prices have advanced 54 percent and the cost of living has risen 68 percent, General Electric selling prices have increased but 13 percent and the average earnings of the company's employees have more than doubled.

Frank Jarosch has just taken charge of the engineering department of the S. B. R. Specialty Co., general offices and works, East Orange, N. J. He was formerly factory manager for the Gurney Ball Bearing Co., of Jamestown, N. Y., and in 1922 founded the Jarosch Bearing Corporation for the purpose of importing and marketing F. & H. Ball and Roller Bearings.

New Meter Company

A new company known as the Bailey Meter Co., on April 1, acquired the flow meter business and patents of the General Electric Co., and the fluid meter and combustion control business and patents of the present Bailey Meter Co.

The engineering, manufacturing and sales organization of the present Bailey Meter Co., will be retained by the new company, with the increase in personnel necessary from the General Electric Co., to handle properly the additional business. The new company will have its factory and general offices in Cleveland, Ohio.

E. G. Bailey, president of the present Bailey Meter Co., will be president of the new company. R. S. Coffin, vice-president of the present Bailey Meter Co., will be vice-president in charge of administration and finances. R. E. Woolley, now connected with the General Electric Co., will be vice-president in charge of engineering and sales. The new Bailey Meter Company will offer a complete line of flow meters, boiler room instruments and combustion control equipment.

Combustion Engineering Cleveland Office

The Cleveland District Offices of Combustion Engineering Corporation, Ladd Water Tube Boiler Co., and Heine Boiler Co., have been consolidated and will be located at 1107 Guardian Building. Mr. Frank Henderson is Cleveland District manager of these three associated companies.

Automatic Safety Feeders

A folder recently issued by the Mining Safety Device Co., Bowerston, Ohio, describes the Nolan Automatic Safety Bumper-Stop Feeders, a new heavy-duty machine which feeds cars to cages, dumps, chain-hauls, etc. The folder is well illustrated, giving details of construction, and performance. Copies may be obtained upon request to the Bowerston office.

A commission of engineers from the Allen & Garcia Co., of Chicago, will leave New York City, May 11, on the Aquitania for the Donetz Basin Coal Fields in Russia, to prepare designs and specifications of American type skip hoisting coal mines. The members of the commission are: John A. Garcia, chief of the party; H. B. Cooley, structural; A. C. Noe, geologist; John A. Garcia, Jr., mining; H. F. Hebley, electrical; A. W. Holmes, mechanical.

It is expected that it will take three months after reaching Kharkov to complete the work and that the party will return to the United States in the late fall.

Beaumont Takes Over American M. & E. Co.

Announcement has just been made that the R. H. Beaumont Co., has taken over the business of the American Mfg. & Engr. Co., of Kalamazoo, Mich., and products formerly manufactured by this company, including American Slack Line Cableway Excavator, which will now be manufactured by the Beaumont Co. The addition of the American Slack Line which already includes the Beaumont-LeClair Cable Drag Scraper, completes a full line of equipment for elevating and storing of sand, gravel, stone and kindred materials. The company is located at 319 Arch Street, Philadelphia, Pa.

Mr. E. H. Sager, formerly Chicago representative for the Ajax Flexible Coupling Co., has recently joined the sales force of Foote Bros. Gear & Machine Co., and is now assigned to territory in the state of Michigan.

New Bulletins of Sullivan Machinery Co.

81-1 Second Edition, Sullivan Concrete Breakers. This bulletin describes two types of tools; a 75-lb. or heavy duty Buster and a 48-lb. light Buster. The bulletin is liberally illustrated to show different applications of concrete breakers in many parts of the country. In addition to the familiar uses, for breaking up pavement or building walls, etc., pictures are shown of Busters digging a tunnel in hard sandstone, driving sheet piling, excavating slag under an open hearth steel furnace, used as a pneumatic spade for digging hard pan, breaking down a mountain of furnace slag, which rock drills would not handle, and trimming the walls of a trench for electric conduits. The illustrations are drawn from many states and include pictures from Vancouver, B. C.; Warsaw, Poland; Newcastle, England; Honolulu and Pretoria, S. Africa.

76-G, Second Edition, Sullivan Electric Portable Hoists. Sullivan single and double drum, electric portable hoists are described in this 16-page bulletin which is illustrated with many application pictures. The adaptability and power of these small machines, having 6½ h.p. motor, is graphically shown. The single drum hoist is used for such jobs as car pulling, erecting steel on derricks or with gin poles, decking logs from railway cars, pulling coal cars in mines, unloading box cars with a scraper; while the double drum unit is employed for jobs requiring two ropes such as scraper loading in mines, trimming coal piles at power plants, operating conveyor systems in coal mines or hauling sawmill refuse with a drag line and power rake. Copies may be secured on application to Sullivan Machinery Co., 122 South Michigan Avenue, Chicago.

New Explosive Films

Hercules Powder Co. have added two new films to their library of industrial education films.

The first film is entitled "The Explosives Engineer—Forerunner of Progress." This two-reel film takes you through their experimental station and the testing station of the U. S. Bureau of Mines at Bruceton, Pa., and graphically shows how explosives are tested by both the manufacturer and the Government. The second part portrays the explosives engineer on the job and the scientific application of explosives to all classes of mining and construction work.

"Hercules Electric Blasting Caps" the other new film was taken at the Port Even cap works in New York State. This film describes graphically the manufacture and construction of an electric blasting cap. The correct method of priming a dynamite cartridge is also illustrated.

These films will be loaned, without charge, and sent postpaid to any one desiring to exhibit them, in either the 16 m/m or 35 m/m width prints. Apply to the Hercules Powder Co., 1222 Delaware Trust Bldg., Wilmington, Del.

ANSWERS TO "ASK ME ANOTHER" QUESTIONS

1. (a) Ascanio Sobrero, an Italian, 1846.
(b) Alfred B. Nobel, a Swedish chemist. His patent for dynamite was granted in 1867.
2. Blasting caps and electric blasting caps.
3. Nitroglycerin.
4. (a) Joseph A. Holmes.
(b) Scott Turner
5. Sulphur, charcoal, and Chile saltpeter.
6. Faster.
7. A galvanometer or an ohmmeter-galvanometer.
8. Block-holing, snakeholing, and mud-capping.
9. 17,500 feet a second.
10. December, 1679, at Ottawa, Ill., by Father Hennepin, a French explorer.
11. In parallel.
12. Gelatin.
13. Fulminate of mercury.
14. Twenty-five pounds.
15. (1) That the explosive is in all respects similar to the sample submitted by the manufacturer for test.
(2) That detonators, preferably electric detonators, are used of not less efficiency than those prescribed, namely, not weaker than a No. 6 detonator.
(3) That the explosive, if frozen, shall be thoroughly thawed in a safe and suitable manner before use.
(4) That the quantity used for a shot does not exceed 1½ pounds (680 grams) and that it is properly tamped with clay or other non-combustible stemming.
16. Ammonia dynamite, gelatin dynamite, straight nitroglycerin dynamite.
17. The Explosives Engineer.
18. FFFF, FFF, FF, F, C, CC, CCC.
19. (a) James F. Callibreath.
(b) H. Foster Bain.
(c) Stephen S. Tuthill.
(d) J. R. Boyd.
(e) Gen. R. C. Marshall, Jr.
(f) W. S. Hays.
20. The Moffat Tunnel, in Colorado, length 6.19 miles.
21. Squarely across (not on an angle).
22. Wood.
23. By burning.
24. Pennsylvania.
Total consumption for 1926:
Black Powder 29,517,125 lbs.
Dynamite 47,918,261 lbs.
Permissible Explosives 33,565,470 lbs.
25. Dynamite. A free copy of a book entitled "Dynamite—The New Aladdin's Lamp" can be obtained by writing to the Explosives Engineer, Wilmington, Del.

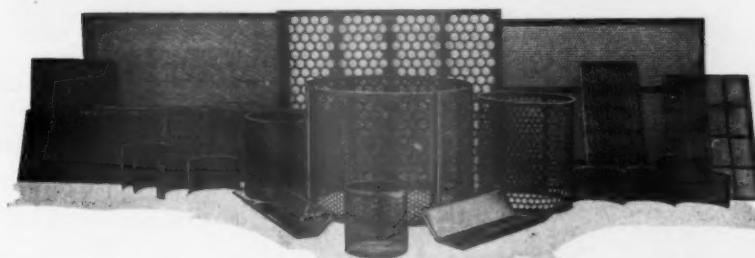
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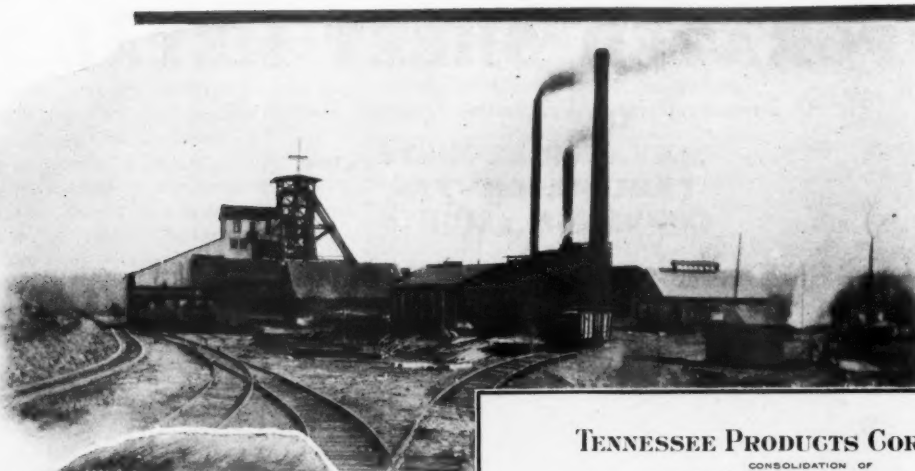
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Ravenscroft, Tennessee.
January 24, 1927.

The American Mining Congress,
Washington, D. C.

Gentlemen:

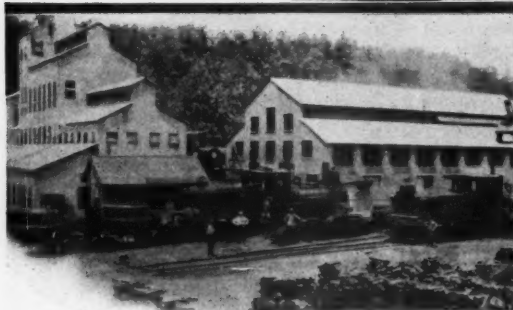
Your letter of Jan. 18th received, with copy
of the American Standard covering Safety Rules for
Installing and Using Electrical Equipment in Coal Mines.
We have included it in our Handbook.

We are well pleased with the contents of the
Handbook and very much appreciate your valuable help
in getting our operations standardized.

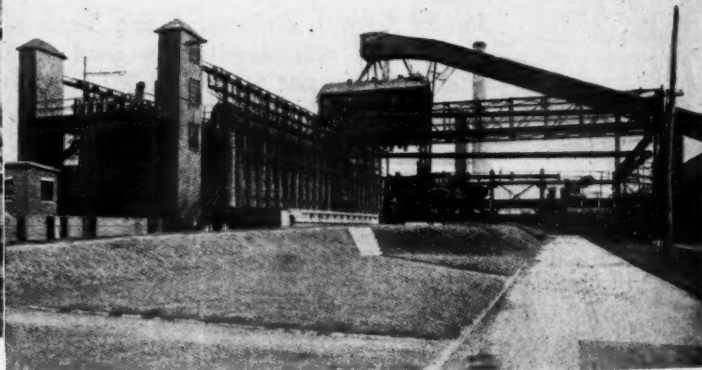
Yours truly,

W. B. Young
General Supt. Coal Division.

WEY:UCP.



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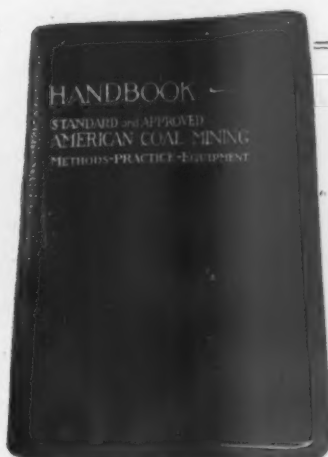
The Tennessee Products Corporation owns extensive tracts of coal, iron and timberlands and manufactures numerous products, chief of which are ferro-phosphorus, wood alcohol, gas, coke, acetate of lime and semi-cold-blast charcoal iron. In addition to the mining of coal and iron, three separate plants manufacture the company's products—a 24-unit Semet-Solvay coke and gas plant at Chattanooga, a blast

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This Handbook is pocket size, loose-leaf, and will be kept up-to-date as recommendations are approved. Its price is \$5. This includes a subscription to The Mining Congress Journal. For further information, address The American Mining Congress.



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CHAINS Silent (Bushed-Pin Joint)

Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

CHAINS, SILENT (Rocker-Joint)

Morse Chain Co., Ithaca, N. Y.

CHAINS, SLING

Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

Morse Chain Co., Ithaca, N. Y.

CHAINS, SPROCKET WHEEL

Goodman Mfg. Co., Halsted St. and 48th Place, Chicago, Ill.

The Jeffrey Mfg. Company, 958-99 North 4th St., Columbus, Ohio.

Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

Morse Chain Co., Ithaca, N. Y.

CLAMPS, HOSE

Knox Mfg. Co., Philadelphia, Pa.

CLAMPS (Trolley)

Ohio Brass Co., Mansfield, Ohio.

CLAMPS, WIRE ROPE

American Steel & Wire Co., Chicago, Ill., and New York.

John A. Roebbling's Sons Co., Trenton, New Jersey

CLIPS, WIRE ROPE

American Steel & Wire Co., Chicago, Ill., and New York.

John A. Roebbling's Sons Co., Trenton, New Jersey

CLUTCHES

Connellsville Mfg. & Mine Supply Co., Connellsville, Pa.

Goodman Mfg. Co., Halsted St. and 48th Place, Chicago, Ill.

The Jeffrey Mfg. Co., 958-99 North 4th St., Columbus, Ohio.

Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

COAL CLEANING MACHINERY

American Rheolaveur Corporation, Wilkes-Barre, Pa.

Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

Roberts & Schaefer Co., Chicago, Ill.

COAL COMPANIES

General Coal Company, Land Title Bldg., Philadelphia, Pa.

Lehigh Coal & Navigation Co., Philadelphia, Pa.

Thorne, Neale & Co., Philadelphia, Pa.

COAL CRUSHERS

Connellsville Mfg. & Mine Supply Co., Connellsville, Pa.

The Jeffrey Mfg. Company, 958-99 North 4th St., Columbus, Ohio.

Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

COAL CRUSHERS & ROLLS

Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

Vulcan Iron Works, Wilkes-Barre, Pa.

COAL CUTTERS

Goodman Mfg. Co., Halsted St. and 48th Pl., Chicago, Ill.

Howells Mining Drill Co., Plymouth, Pa.

Ingersoll-Rand Co., 11 Broadway, New York City.

The Jeffrey Mfg. Company, 958-99 North 4th St., Columbus, Ohio.

Sullivan Machinery Co., 122 S. Mich. Ave., Chicago, Ill.

COAL HANDLING MACHINERY

Conveyor Sales Co., Inc., 299 Broadway, New York City.

Goodman Mfg. Co., Halsted St. and 48th Place, Chicago, Ill.

The Jeffrey Mfg. Company, 958-99 North 4th St., Columbus, Ohio.

Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

Roberts & Schaefer Co., Chicago, Ill.

COAL LOADERS

Goodman Mfg. Co., Halsted St. and 48th Place, Chicago, Ill.

The Jeffrey Mfg. Company, 958-99 North 4th St., Columbus, Ohio.

Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

COAL MINING MACHINERY

Goodman Mfg. Co., Halsted St. and 48th Pl., Chicago, Ill.

Howells Mining Drill Co., Plymouth, Pa.

Ingersoll-Rand Co., 11 Broadway, New York City.

The Jeffrey Mfg. Company, 958-99 North 4th St., Columbus, Ohio.

Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

Sullivan Machinery Co., 122 S. Mich. Ave., Chicago, Ill.

COAL MINING PLANTS

Goodman Mfg. Co., Halsted St. and 48th Place, Chicago, Ill.

Ingersoll-Rand Co., 11 Broadway, New York City.

The Jeffrey Mfg. Company, 958-99 North 4th St., Columbus, Ohio.

Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

Roberts & Schaefer Co., Wrigley Bldg., Chicago, Ill.

COAL SEPARATORS (Pneumatic)

Roberts & Schaefer Co., Chicago, Ill.

COMPRESSORS, AIR

Allis-Chalmers Mfg. Co., Milwaukee, Wis.

Ingersoll-Rand Co., 11 Broadway, New York City.

COMPRESSORS, MINE CAR

Ingersoll-Rand Co., 11 Broadway, New York City.

CONCENTRATORS (Table)

Allis-Chalmers Mfg. Co., Milwaukee, Wis.

CONCRETE REINFORCEMENT

American Steel & Wire Co., Chicago, and New York.

CONDENSERS

Allis-Chalmers Mfg. Co., Milwaukee, Wis.

Ingersoll-Rand Co., 11 Broadway, New York City.

CONTROLLERS

Goodman Mfg. Co., Halsted St. and 48th Place, Chicago, Ill.

CONVERTORS, COPPER

Allis-Chalmers Mfg. Co., Milwaukee, Wis.

CONVEYORS

Conveyor Sales Co., Inc., 299 Broadway, New York City.

The Jeffrey Mfg. Company, 958-99 North 4th St., Columbus, Ohio.

Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

Roberts & Schaefer Co., Chicago, Ill.

CONVEYOR BEARINGS

Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

CONVEYORS, BELT

The Jeffrey Mfg. Company, 958-99 North 4th St., Columbus, Ohio.

Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

CONVEYORS, CHAIN FLIGHT

The Jeffrey Mfg. Company, 958-99 North 4th St., Columbus, Ohio.

Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

CONVEYORS, COAL

Conveyor Sales Co., Inc., 299 Broadway, New York City.

The Jeffrey Mfg. Company, 958-99 North 4th St., Columbus, Ohio.

Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

CONVEYORS AND ELEVATORS

Allis-Chalmers Mfg. Co., Milwaukee, Wis.

Conveyor Sales Co., Inc., 299 Broadway, New York City.

The Jeffrey Mfg. Company, 958-99 North 4th St., Columbus, Ohio.

Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

CONVEYORS, PAN OR APRON

Conveyor Sales Co., Inc., 299 Broadway, New York City.

The Jeffrey Mfg. Company, 958-99 North 4th St., Columbus, Ohio.

Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

CONVEYORS, SCREW

The Jeffrey Mfg. Company, 958-99 North 4th St., Columbus, Ohio.

Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

COOLERS, Man

Robinson Ventilating Co., Zelienople, Pa.

COOLERS, ROTARY

Vulcan Iron Works, Wilkes-Barre, Pa.

COPPER WIRE & STRAND (Bare)

American Steel & Wire Co., Chicago, Ill., and New York.

John A. Roebbling's Sons Co., Trenton, New Jersey

CORE DRILLS, Carbon (Diamonds) for

R. S. Patrick, Sellwood Building, Duluth, Minn.

CORE DRILLING

H. R. Ameling Prospecting Co., Rolla, Mo.

Hoffman Bros., Punxsutawney, Pa.

Mott Core Drilling Co., Huntington, W. Va.

COUPLINGS, FLEXIBLE

Fawcett Machine Co., Pittsburgh, Pa.

COUPLINGS, ROCK DRILL

Knox Mfg. Co., Philadelphia, Pa.

CROSSINGS AND CROSSEOVERS

Central Frog & Switch Co., Cincinnati, Ohio.

CROSSOVERS

Sweet's Steel Co., Williamsport, Pa.

CRUSHERS

The Jeffrey Mfg. Company, 958-99 North 4th St., Columbus, Ohio.

Allis-Chalmers Mfg. Co., Milwaukee, Wis.

CRUSHERS, COAL

Connellsville Mfg. & Mine Supply Co., Connellsville, Pa.

The Jeffrey Mfg. Company, 958-99 North 4th St., Columbus, Ohio.

Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

CRUSHERS, SINGLE & DOUBLE ROLL

The Jeffrey Mfg. Company, 958-99 North 4th St., Columbus, Ohio.

Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

CRUSHING PLANTS, COKE

The Jeffrey Mfg. Company, 958-99 North 4th St., Columbus, Ohio.

Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

CUP GREASE

Keystone Lubricating Co., Philadelphia, Pa.

CUTTING APPARATUS, Oxy - Acetylene, Oxy - Hydrogen

Oxweld Acetylene Co., 30 E. 42d St., New York City.

Decarbonizing Apparatus

Oxweld Acetylene Co., 30 E. 42d St., New York City.

DESIGNERS OF PLANTS

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Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

Roberts & Schaefer Co., Chicago, Ill.

DIAMOND CORE DRILL CONTRACTING

H. R. Ameling Prospecting Co., Rolla, Mo.

Hoffman Bros., Punxsutawney, Pa.

Mott Core Drilling Co., Huntington, W. Va.

Sullivan Machinery Co., Chicago, Ill.

DIAMOND DRILLING CARBON

R. S. Patrick, Sellwood Building, Duluth, Minn.

R. S. Patrick, Sellwood Building, Duluth, Minn.

Hoffman Bros., Punxsutawney, Pa.

Howells Mining Drill Co., Plymouth, Pa.

Ingersoll-Rand Co., 11 Broadway, New York City.

Keystone Churn Drill Co., Beaver Falls, Pa.

Mott Core Drilling Co., Huntington, W. Va.

Howells Mining Drill Co., Plymouth, Pa.

Ingersoll-Rand Co., 11 Broadway, New York City.

Keystone Churn Drill Co., Beaver Falls, Pa.

Mott Core Drilling Co., Huntington, W. Va.

Howells Mining Drill Co., Plymouth, Pa.

Ingersoll-Rand Co., 11 Broadway, New York City.

Keystone Churn Drill Co., Beaver Falls, Pa.

Mott Core Drilling Co., Huntington, W. Va.

DIGGERS & PICKS, Pneumatic

Ingersoll-Rand Co., New York City.

DITCHING MACHINES

Keystone Churn Drill Co., Beaver Falls, Pa.

DOORS, AUTOMATIC MINE

American Mine Door Co., Canton, Ohio.

DOWNIE DEEP WELL PUMPS

Keystone Churn Drill Co., Beaver Falls, Pa.

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Ingersoll-Rand Co., 11 Broadway, New York City.

DRILLING, DIAMONDS FOR

R. S. Patrick, Sellwood Building, Duluth, Minn.

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Ingersoll-Rand Co., 11 Broadway, New York City.

DRILLS (Blast Hole)

Howells Mining Drill Co., Plymouth, Pa.

Ingersoll-Rand Co., 11 Broadway, New York City.

Keystone Churn Drill Co., Beaver Falls, Pa.

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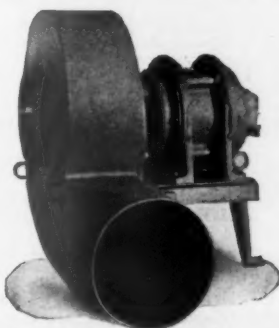
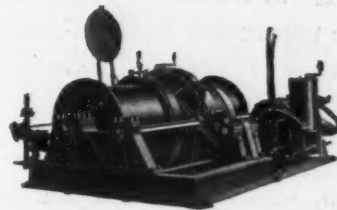
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Ohio Brass Co., Mansfield, Ohio.

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ELEVATORS, BUCKET

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Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

ELEVATOR CABLES & ROPES

John A. Roebling's Sons Co., Trenton, New Jersey.

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Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

ENGINES, GAS AND GAS-OIL

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Connellsville Mfg. & Mine Supply Co., Connellsville, Pa.

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ENGINES, Rope Haulage

S. Flory Mfg. Co., Bangor, Pa.

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FAN DRIVES

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Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

FANS, Man Cooling

Robinson Ventilating Co., Zelenople, Pa.

FANS, Turbine

Robinson Ventilating Co., Zelenople, Pa.

FANS, VENTILATING

Connellsville Mfg. & Mine Supply Co., Connellsville, Pa.

The Jeffrey Mfg. Company, 958-99 North 4th St., Columbus, Ohio.

Robinson Ventilating Co., Zelenople, Pa.

Vulcan Iron Works, Wilkes-Barre, Pa.

FEEDERS (Crossover, Kick-back, Rotary and Dump)

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Mining Safety Device Co., Bowers-ton, Ohio.

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FLOW METERS

General Electric Co., Schenectady, N. Y.

FLUX, WELDING

Oxweld Acetylene Co., 30 E. 42nd St., New York City.

FORGINGS

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Sweet's Steel Co., Williamsport, Pa.

FROGS AND SWITCHES

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West Virginia Rail Co., Huntington, W. Va.

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GAUGES, WELDING

Oxweld Acetylene Co., 30 E. 42nd St., New York City.

GEARS

Goodman Mfg. Co., Halsted St. and 48th Place, Chicago, Ill.

The Jeffrey Mfg. Company, 958-99 North 4th St., Columbus, Ohio.

Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

GEARS, BEVEL

Fawcens Machine Co., Pittsburgh, Pa.

Goodman Mfg. Co., Halsted St. and 48th Place, Chicago, Ill.

The Jeffrey Mfg. Company, 958-99 North 4th St., Columbus, Ohio.

Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

GEARS, HERRINGBONE

Fawcens Machine Co., Pittsburgh, Pa.

Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

GEARS, Machine Cut

Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

Vulcan Iron Works, Wilkes-Barre, Pa.

GEARS, Moulded Tooth

Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

Vulcan Iron Works, Wilkes-Barre, Pa.

GEARS, SILENT CHAIN

Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

Morse Chain Co., Ithaca, N. Y.

GEARS, SPUR

Fawcens Machine Co., Pittsburgh, Pa.

Goodman Mfg. Co., Halsted St. and 48th Place, Chicago, Ill.

The Jeffrey Mfg. Company, 958-99 North 4th St., Columbus, Ohio.

Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

GEARS, WORM

Fawcens Machine Co., Pittsburgh, Pa.

The Jeffrey Mfg. Company, 958-99 North 4th St., Columbus, Ohio.

GEARS, WORM WHEELS

Fawcens Machine Co., Pittsburgh, Pa.

GENERATORS AND GENERATING SETS

Allis-Chalmers Mfg. Co., Milwaukee, Wis.

Goodman Mfg. Co., Halsted St. and 48th Pl., Chicago, Ill.

GENERATORS, ACETYLENE

Oxweld Acetylene Co., 30 E. 42nd St., New York City.

GLOVES, ASBESTOS

Oxweld Acetylene Co., 30 E. 42nd St., New York City.

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Ingersoll-Rand Co., New York City.

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Ingersoll-Rand Co., New York City.

HANGERS (Insulated Trolley)

Ohio Brass Co., Mansfield, Ohio.

HAULAGE ROPE

American Steel & Wire Co., Chicago, Ill., and New York.

John A. Roebling's Sons Co., Trenton, New Jersey.

HEADLIGHTS, ARC AND INCANDESCENT

Goodman Mfg. Co., Halsted St. and 48th Pl., Chicago, Ill.

The Jeffrey Mfg. Company, 958-99 North 4th St., Columbus, Ohio.

Ohio Brass Co., Mansfield, Ohio.

HEATER CORD

John A. Roebling's Sons Co., Trenton, New Jersey.

HERRINGBONE GEAR DRIVES

Fawcens Machine Co., Pittsburgh, Pa.

Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

HOIST DRIVES

Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

HOISTING ROPES

American Steel & Wire Co., Chicago, Ill., and New York.

Connellsville Mfg. & Mine Supply Co., Connellsville, Pa.

A. Leach & Sons Rope Co., St. Louis, Mo.

John A. Roebling's Sons Co., Trenton, New Jersey.

HOISTS

American Steel & Wire Co., Chicago and New York.

Ingersoll-Rand Co., 11 Broadway, New York City.

Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

Sullivan Machinery Co., 122 S. Mich. Ave., Chicago, Ill.

HOISTS, AIR

Ingersoll-Rand Co., 11 Broadway, New York City.

Sullivan Machinery Co., 122 S. Mich. Ave., Chicago, Ill.

HOISTS, ELECTRIC

Allis-Chalmers Mfg. Co., Milwaukee, Wis.

Connellsville Mfg. & Mine Supply Co., Connellsville, Pa.

Diamond Machine Co., Monongahela, Pa.

Goodman Mfg. Co., Halsted St. and 48th Place, Chicago, Ill.

Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

Sullivan Machinery Co., 122 S. Mich. Ave., Chicago, Ill.

Vulcan Iron Works, Wilkes-Barre, Pa.

HOISTS, PORTABLE

Ingersoll-Rand Co., 11 Broadway, New York City.

Sullivan Machinery Co., 122 S. Mich. Ave., Chicago, Ill.

HOISTS, Derrick

S. Flory Mfg. Co., Bangor, Pa.

HOISTS, GASOLINE

S. Flory Mfg. Co., Bangor, Pa.

HOISTS, Room

S. Flory Mfg. Co., Bangor, Pa.

HOISTS, Room and Gathering

S. Flory Mfg. Co., Bangor, Pa.

Goodman Mfg. Co., Halsted St. and 48th Place, Chicago, Ill.

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Ingersoll-Rand Co., New York City.

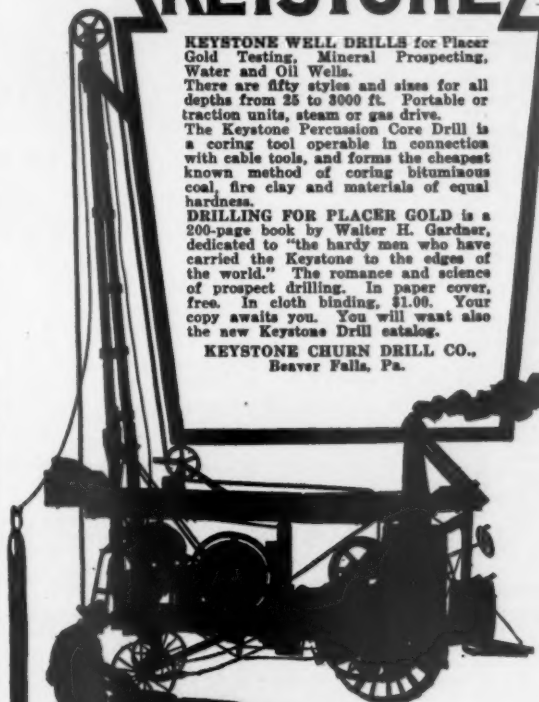
HOISTS, Shaft, Electric

S. Flory Mfg. Co., Bangor, Pa.

HOISTS, Shaft, Steam

S. Flory Mfg. Co., Bangor, Pa.

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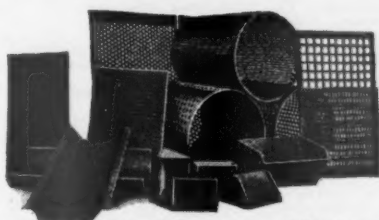
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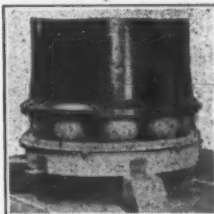
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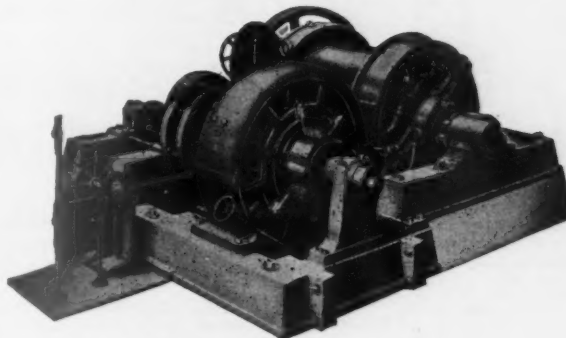
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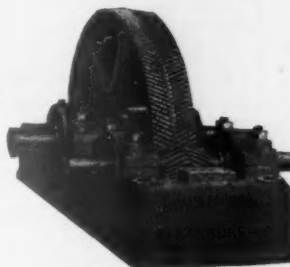
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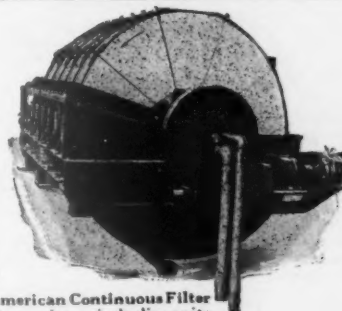
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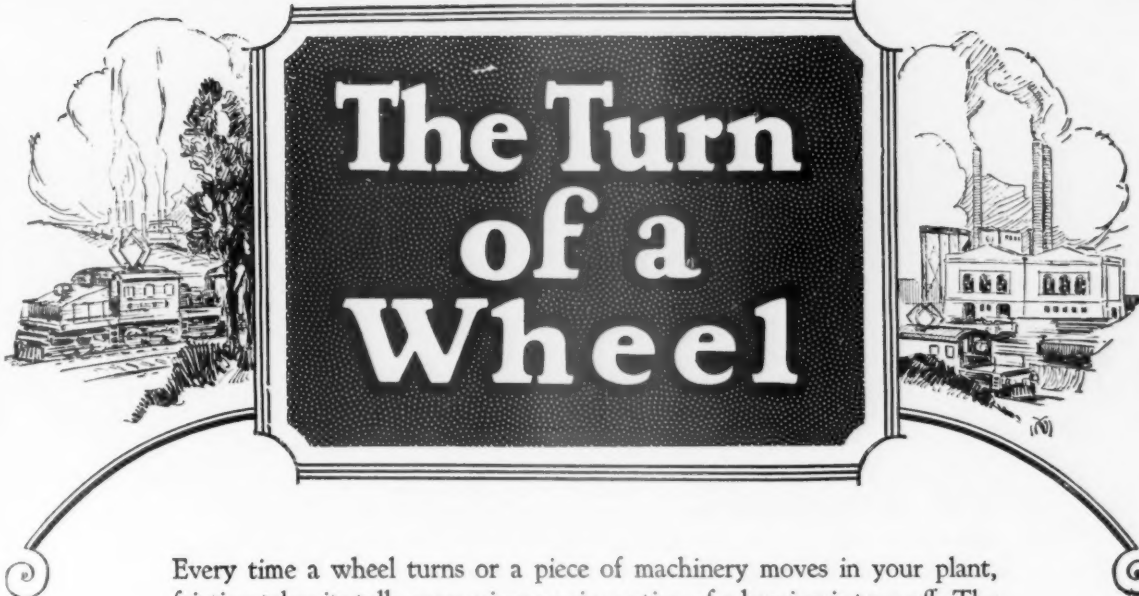
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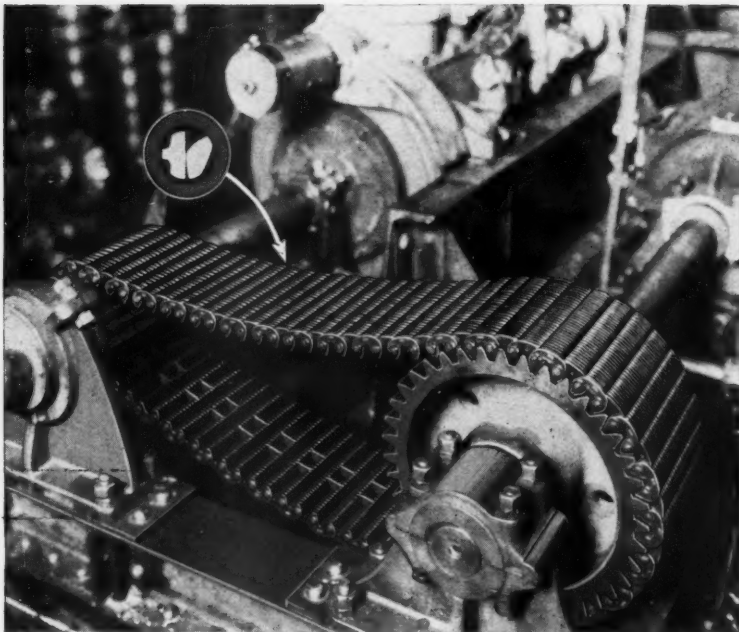
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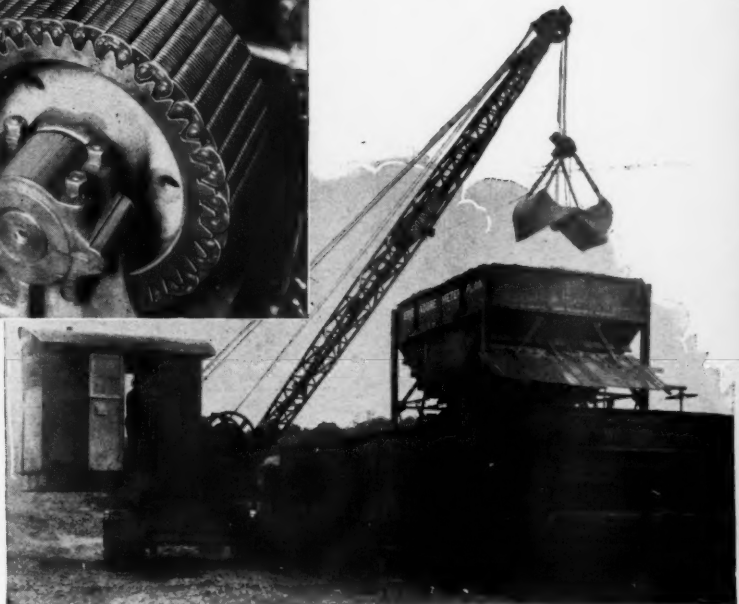
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